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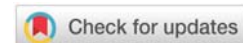
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Research Article

Proposition and practical significance of two classes of new teaching methods and diversified assessment during the coronavirus disease 2019 pandemic

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Abstract

After entering the new century, people are facing a new external environment. Recently human society is coming into knowledge economy era, and the industrial structure has deeply been adjusted. Today, the past teaching method of imparting knowledge and getting people to accept education, or exam-oriented teaching ideas have been unable to keep up with the needs of the development of the Times. In the future, the key point of education is to promote people to understand the knowledge, and grasp rules between things. Based on this, it is particularly necessary for the talents cultivation to adopt a new idea of training. The paper takes the major in mathematics as an example, designs two classes of new teaching methods CT&CL (Collaborative Teaching & Cooperative Learning) and BOOF (Based on Our Features) with the diversified assessment to cultivate students' innovative thinking, providing a reference for the other students. The two classes of new teaching methods and the diversified assessment are worthy of further spreading and exercising during the coronavirus disease 2019 pandemic.

Two new teaching methods

Background

At the same time as the transformation of Chinese universities from elite education to mass education, there has been a problem of a significant decrease in the quality of education. There is a high rate of absenteeism in university classrooms during the coronavirus disease 2019 pandemic.

It is not uncommon for students not to listen carefully and skip classes; students play mobile phones, chat, and daze during class, and problems such as "learning without learning, knowledge without knowledge, and text without knowledge" arise; at the same time, university teachers have heavy teaching burdens, poor results and huge psychological pressure [1].

If the teaching methods adopted by university teachers damage the interest and passion of students, they are only used to passive acceptance and rote learning, and lack of independent thinking and positive thinking, what kind of "talent" will be cultivated by university education? There are many attempts at classroom teaching reform in the internet age, but reasonable reforms should not only consider the progress of network technology, but also consider the changes of learning groups, teacher groups and social environment [2].

Issues raised

Since many university teachers in China believe that the teaching methods are soft and the number of teaching tasks is hard, the energy invested in new teaching methods is obviously insufficient, and they have made great efforts in writing papers

and appraising titles [3]. At the same time, among the first-line teachers in universities, there is endless wisdom and power for further innovation in new teaching methods [4].

In order to bring innovation in new teaching methods to a new level, further optimize teaching methods and improve the quality of talent training. We made it clear that the key to further innovation of new teaching methods relies on teachers, and then combine the advantages of domestic and foreign teaching methods to make trade-offs.

We have successively created 24 new teaching methods including "CT&CL teaching method" and "BOOF teaching method". Herein, this article only introduces the practical significance of CT&CL teaching method, BOOF teaching method, and diversified assessment [5].

Proposal of diversified assessment

Background: For students entering university, compared with their high school life, university life is rich and colorful, various clubs and organizational activities are overwhelming, more and more tempted, learning motivation is getting smaller and smaller, and learning utilitarian thinking is getting heavier; On the other hand, there are many only children in China, the students' psychological quality is poor, and their psychological endurance is weak, forcing teachers to be forced to make it easier and easier to produce test questions, which is contrary to the original intention of curriculum assessment.

At the same time, with the development of the times, the ability to evaluate students' ability to analyze and understand problems through scores began to be questioned. The main reason is that the society's demand for talents is multi-faceted, not only limited to students' ability to answer questions, but also manifested in students' ability to express speech, communication and other aspects. The latter often fails to pass standardized tests draw correct conclusions. Therefore, a certain degree of adjustment is needed for the evaluation methods of college students.

Because the assessment methods currently adopted by universities are mostly conducted in the form of final exams, as a result, teachers appear to speak loudly in class, students do not listen carefully, and they hold their feet before the exam and take luck in the exam, which makes the students develop the bad habits of "all for the exam". Years of teaching practice experience show that the single assessment model makes students less motivated and has insufficient comprehensive knowledge, which is not conducive to linking theory with practice. In order to improve the innovative thinking and creativity of college students, university education needs to build on the quality standards of courses and build a comprehensive evaluation model of student diversification [6-9].

Diversified assessment

Diversified assessment is a comprehensive evaluation, the purpose of which is to improve students' comprehensive ability. Its advantages are: attach importance to process assessment

and urge students to develop good learning habits; real-time and effective teaching feedback helps teachers master the teaching progress and provide "precision support for students with learning difficulties". Diversified assessments can satisfy students' choice of their own learning methods, and allow students to know their current learning status in real time, which is easy to form a learning atmosphere that you are catching up with [8].

Diversified assessment refers to the use of learning pyramid theory as a guide, on the basis of flipped courses and micro-courses, to increase a variety of assessment and incentive methods for students in the process of teaching, learning, thinking, arguing and acting. Finally, the final grade assessment is completed on a point system, which transforms students' passive learning into an active learning teaching model. The following 6 aspects are used for diversified assessments: study notes, weekly (chapter) test, interactive communication, teaching video production, related paper publication and final exam.

Requirements for study notes (100 points in total): preview notes (15 points) preview gains and questions; lecture notes (25 points) lecture gains and question answers; practice notes (30 points) practice gains, design verification; chapter summary and course Summary (30 points).

Weekly (chapter) test scores (100 points in total): A total of 10 weeks of classes, 10 tests, 10 points each time; one mistake is allowed, the last time can replace the lowest score in the front; the final score is calculated 9 times at the end

$$\text{Final assessment score} = \frac{10}{9} \sum_{i=1}^9 \text{Weekly test score } x_i \quad (1)$$

Interactive communication score: (group) preview score, 10 times, full score 50 points; (individual and group) classroom communication score, 3-5 points each time; (individual) forum interaction score, 1-10 points each time.

$$\text{Forum interactive score} = \text{Student help points} \times 20\% + \text{Teacher reward points} \times 80\% \quad (2)$$

Overall evaluation score = Classroom communication score + Forum interactive score + Preview score

If the total score exceeds 100 points, the conversion formula is:

$$\text{Final score at the end of the period} = \frac{\text{Total score}}{\text{Max (Total score of the whole class)}} \times 100 \quad (3)$$

Teaching video production requirements: at least 5 micro-videos, each video between 5-15 minutes; at least 5 chapters of content; each video completes the learning of a knowledge point; can learn this knowledge from other students are instructive.

Related papers published: Different grades have different scores, and quantitative indicators are being developed.

Final exam results: This part will be cancelled gradually.



Evaluation method: Students who use math software course here, because math software course is more comprehensive, as shown in Table 1.

Different assessment methods are suitable for different types of student groups. The process assessment urges students to develop good learning habits; real-time score announcements tell students to pay to gain; real-time effective teaching feedback and interaction are conducive to targeted poverty alleviation; the point system makes young people in the Internet era more friendly; and group learning conducive to the cultivation of team spirit of college students.

The diversified assessment puts forward higher requirements for teachers: teachers need to carefully complete pre-semester preparation, pre-class, mid-class and post-class arrangements.

Table 1: Assessment method.

Assessment method	number of students choose	Number of students have scores
study notes	15	5
Weekly (chapter) test	207	189
Small software development	27	22
Interactive communication	207	3
Final exam	42	20
Total	498	239

CT&CL teaching method and practical significance of diversified assessment

CT&CL teaching method: The CT&CL teaching method is based on the concept of “cooperation”, where several teachers (including online teachers) give students the same course on the spot. The main process of this method is: (1) In the first week, experienced professors give framed lectures, and divide students into small groups, and other teachers guide students to discuss in various organizations. Students have the opportunity to communicate with teachers, and teachers can also participate in discussions at any time; (2) The second week is taught by an associate professor, and other teachers organize student discussions. At this time, student-student, teacher-student interaction, and teacher-teacher interaction are emphasized; (3) Three weeks are taught by young lecturers, and other teachers organize and guide students to discuss, summarize and summarize in a timely manner, and form a consensus; (4) In the last week, firstly, an experienced professor will summarize and check for vacancies, and then other teachers will guide students to learn all kinds of the opinions are comprehensively organized so that everyone can form a consensus, and let them have a share so that they can jointly complete the teaching tasks of the course.

The application of CT&CL teaching method in biomathematics

The following takes the practice of CT&CL teaching method in the course of “Biomathematics” as an example.

The first section

First, an experienced professor gave a framed lecture, introducing the British statistician--Thomas Robert Malthus. In his published book “Principles of Population”, based on more than 100 years of demographic data, the basic assumptions of the population model are proposed for the law of population growth: in the process of natural population growth, the net relative growth rate (i.e., the ratio of the net increase in population per unit time to its total) is constant r . On this basis, he derived the following differential equation model from the analysis of population growth and food supply and demand growth:

It is known that the population at the initial time t_0 is $N(t_0) = N_0$, and the population at time t is $N = N(t)$. After a short time Δt , at time $t + \Delta t$, the population becomes $N(t + \Delta t)$. Based on the above basic assumptions, the increase in population should be proportional to the population $N(t)$ at the time Δt , and the proportionality coefficient is the constant r above, then in Δt , the population increment can be written as

$$N(t + \Delta t) - N(t) = rN(t)\Delta t \tag{4}$$

Then divide both sides of the above formula by Δt at the same time to get $\frac{N(t + \Delta t) - N(t)}{\Delta t} = rN(t)$, then when $\Delta t \rightarrow 0$, $N(t)$ satisfies:

$$\frac{dN}{dt} = rN \text{ or } \frac{1}{N} \frac{dN}{dt} = r \tag{5}$$

The differential equation model (5) is called the Malthusian model [10].

The above example shows that the CT&CL teaching method is so important for students learning “Biomathematics”.

The second section

Next, an associate professor introduced Francis Galton. Galton went deep into the hinterland of Africa for exploration and investigation from 1845 to 1852, collected a lot of data, and put a lot of effort into the mathematical models and related relationships hidden in the data.

After the above content is introduced, other teachers guide students to discuss in each group. Students have the opportunity to communicate with teachers, and teachers can also participate in discussions at any time. The students will ask some questions, and several teachers can answer the students from different angles, which shows that the teachers fully respect and meet the students’ personalized learning needs.

The third section

A young lecturer guides students to understand the British biostatistician Ronald Aylmer Fisher. In 1915, Fisher’s paper

“Frequency Distribution of Correlation Coefficients of Infinite Population Samples” published in the journal “Biostatistics” was called the first paper on modern inference methods in biostatistics; at the same time, it gave students an additional understanding of the UK Biostatisticians Jerzy Neyman and Egon Sharpe Pearson, who proposed the Neyman–Pearson lemma, brought a new look to hypothesis testing and estimation theory [11].

Conclusion

Finally, the experienced professor summarizes, and then analyzes the content of this lesson from different perspectives according to the interaction with the students, so that everyone can form a consensus and complete the teaching work of the course.

CT&CL teaching method and diversified assessment

In the course of “Biomathematics”, teachers introduce biomathematics to students for the first time, try to think of themselves as learners, and study together with students; teachers and students need to participate in the formulation of goals and the innovative practice of new teaching methods. The purpose is to shorten the distance between teachers and students, to make the communication between teachers and students more comfortable and harmonious, and to improve students’ flexible thinking ability, to enhance students’ initiative to discuss problems, and to encourage students to integrate into classroom teaching more quickly. And it can accelerate the innovation and practice of CT&CL teaching method.

The CT&CL teaching method emphasizes “teacher–student sharing”, that is, teachers inspire students’ innovative thinking and ignite students’ creative inspiration in constructing a classroom full of vitality. This method can greatly arouse the enthusiasm of teachers and students, and give full play to the leading role of students and teachers. At the same time, the group discussion was also used to score the discussion process, and the method of random random inspection was used to supervise the mutual assistance and communication between the members of the group and promote the cooperation between teachers and students to answer together. The combination of this common collaborative teaching method and diversified assessment is conducive to the cultivation of teachers’ and students’ thinking ability and teamwork ability. During the discussion, teachers and students learn to inspire each other from different perspectives, promote, deepen understanding and deepen friendship. In the process of communication and sharing, teachers and students constantly reflect on and improve themselves, and truly realize the students–students, teacher–student, and teacher–teacher interactions, and promote the purpose of the exchange of ideas and emotions between teachers and students [6].

The BOOF teaching method and the practical significance of diversified assessment

“The BOOF Teaching Method” we proposed in 2012

emphasizes returning the classroom to students, 70% is used for teaching, and 30% is used for communication and guidance according to the characteristics of teachers and students. It is easy to establish a good teacher–student interaction relationship. Specific requirements are as follows:

First, the BOOF teaching method is based on a broad teaching method. We need to establish a more open mindset for new and excellent teaching methods at home and abroad, focusing on a comprehensive understanding of new teaching methods at home and abroad, as a basis for our self–confidence, and establish a BOOF teaching method with a complete and comprehensive perspective.

Second, the BOOF teaching method is based on professionalism and rationality. If there is no professional foundation, we lack the analysis and identification of the formation process of the BOOF teaching method; at the same time, with sober reason, it is more conducive to the formation of the BOOF teaching method.

During the implementation of the BOOF teaching method, not only should the characteristics of the course itself be considered, but more emphasis should be placed on starting from the existing knowledge background of teachers and students, so that students can actively cooperate with teachers’ innovative teaching methods and practices. As shown in the following Figure 1.

Practical results show that BOOF teaching methods and multiple assessments have achieved good teaching results while maintaining a moderate learning burden, and have been recognized by many teachers and students [7].

Conclusion

In summary, the article analyzes the proposed and practical significance of the two new teaching methods of CT&CL and BOOF. The purpose is to essentially solve the plight of the current classroom teaching in China’s universities and provide a new method for the reform of the teaching methods of university education in China [8].

The combination of two new teaching methods, CT&CL and BOOF, and diversified assessments make it unnecessary for teachers to return to the correct positioning of “leaders” without attracting students to “perform” [9]. At the same time, students’ learning initiative can be brought into play, and their learning ability and learning level are rapidly improved [12], which will “force” teachers to improve teaching levels. This is not a bad thing, but may be the only way to improve the quality of Chinese university education [10].

The combination of two new teaching methods of CT&CL and BOOF and diversified assessments is a new exploration of Chinese university teaching reform. Practical experience needs to be slowly accumulated, but there is no doubt that it is the fresh blood of university teaching methods and assessment methods. University educators have brought new horizons [13].

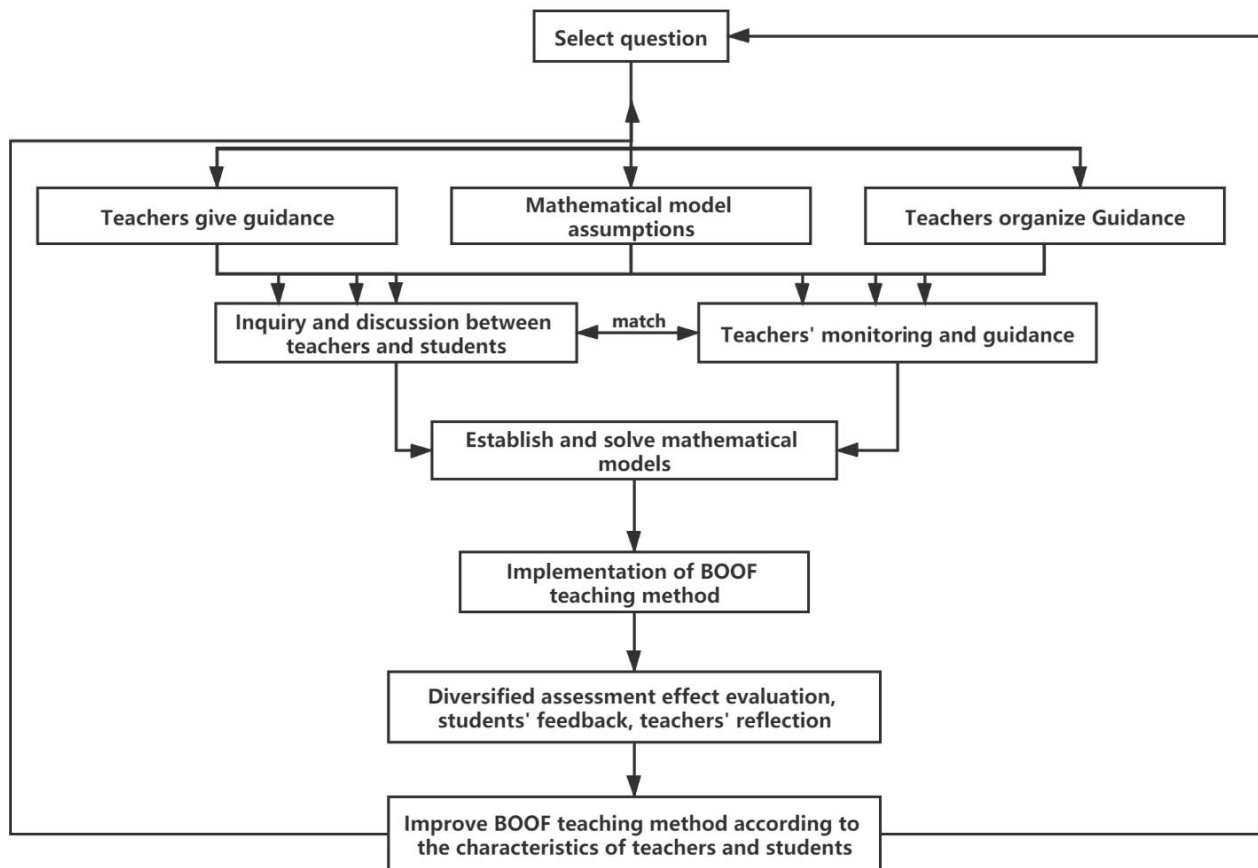


Figure 1: Flow chart of BOOF teaching method and diversified assessment.

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