

## Research on Blended Learning Mode Based on the Micro-Lecture in Database Application

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### ABSTRACT

With the development of educational technology, micro-lecture and flipped classroom becomes a hot topic all over the world. Blended learning which combining the face to face teaching and online learning is becoming a trend in colleges and universities. Flipped classroom is based on micro-lecture. The paper introduces the background and significance of flipped classroom and blended learning; Taking Database Application course as an example, presents a kind of flipped classroom model based on micro-lecture, and gives the framework and process, as well as means of the manufacture of micro-lecture. The blended teaching mode is refreshing and has practical significance. Practice shows that the model can meet the needs of personalized learning, promote the quality of teaching.

**Keywords:** Micro-lecture, Database application, Flipped-classroom, Blended learning.

### 1. INTRODUCTION

With the rapid development of information technology, multimedia and network as the representative of information technology has a revolutionary impact on higher education. MOOC (massive open online courses) and micro-lecture with new teaching mode and idea is inverting the university classroom [1-3]. Inverting (or flipped), the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa [4]. The use of learning technologies, particularly multimedia, provide new opportunities for students to learn, opportunities that are not possible with other media. For example, the use of the World Wide Web and multimedia computers (and/or VCRs) enables students to view lectures either in computer labs or at home, whereas homework assignments can be done in class, in groups. The general principle is to provide a menu of options for the students to use in learning. The instructors focus on the desired outcome (for instance, having the student prepared for discussion) and allow the student to choose the best method to reach that outcome. So how to make good use of this new form of teaching, promote teaching and modern information technology to integrate deeply has become educational circles widespread concern.

In foreign countries, Khan Academy and TEDEd, which is the representative of micro network teaching video triggers many education practitioners to explore application of micro-lecture to the educational practices according to

different subjects, different types of courses. The Khan Academy platform enables visualizing videos linked from YouTube [5], posting comments and responses on videos, and solving exercises. In addition, the platform implements a specific gamification strategy, according to which students can earn energy points and badges by completing the different activities. There is also a powerful learning analytics module that helps students and professors understand better the learning process. After a period of classroom practice, they have achieved good teaching effect. In China, scholars also began to combine courses to demonstrate the effectiveness of specific application mode. Moreover, flipped classroom is widely used in computer course [6]. The flipped classroom teaching complies with the demand of the computer course which pays more attention to students' ability of the self-study and practice.

In China, Peking University, Shanghai Jiao Tong University and other Chinese schools began to launch MOOC (Open Online Courses Massive large-scale open network courses) in 2012 [7], as a new kind of curriculum resource, the micro-lecture has important significance to our country's education informationization and the reform of teaching and learning mode. The new teaching mode, which is based on the micro video, has attracted wide attention from researchers and teachers. This paper presents the applying micro-lecture to the course of database application, hope that through its application, deepen the classroom teaching model reform, meet the needs of personalized learning, and promote the quality of teaching.

## 2. SITUATION ANALYSIS OF DATABASE APPLICATION COURSE

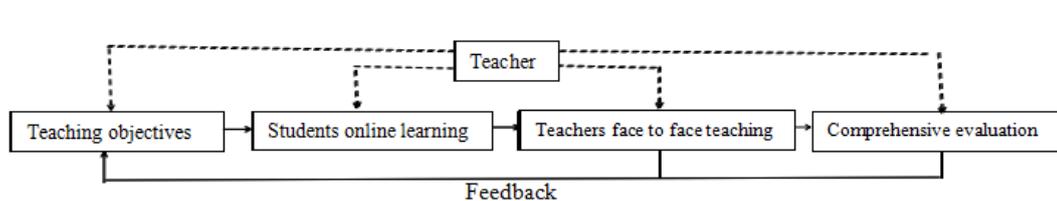
Database application is a core curriculum of non-computer majors in our university, the purpose of this course is to understand the role of database technology in the field of each social field, grasp the basic knowledge of database, learn to analyze and manage a variety of data base management system, master the design, development and maintenance of the database application system. It helps student to build process-oriented and object-oriented programming ideas. It is especially important in a non-computer professional students.

Traditional teaching is to pay attention to collective teaching, and teaching time is fixed, students in the learning process generally felt that the programming language is abstract and difficult to understand. It leads to losing interest and confidence on the programming. This shows that the traditional teaching methods are not suitable for teaching of programming languages. We need to reform and explore the teaching mode of this course. Micro-lecture focus on individual learning, that is, students' autonomous exploratory learning, can be very good to reduce the workload of classroom teaching, improve students' interest in learning knowledge.

## 3. APPLICATION BLENDED LEARNING STRATEGIES BASED ON MICRO-LECTURE

### 3.1 Blended learning model

In the traditional approach, instruction was provided in the classroom. Blended learning is a formal education program in which a student learns at least in part through delivery of content and instruction via digital and online media with some element of student control over time, place, path, or pace. While students still attend "brick-and-mortar" schools with a teacher present, face-to-face classroom methods are combined with computer-mediated activities [8]. Blended learning is also used in professional development and training settings. Therefore, the construction of blended learning model must be based on the interaction between face-to-face teaching and online learning, through continuous comprehensive evaluation, and gradually achieve the effect of excellent teaching and learning. The framework of blended learning model is shown in Figure 1. It is not only good for teacher to play the leading role of teachers' guidance, inspire and monitor the teaching process, but also fully reflect the students' initiative, enthusiasm and creativity as the main body of learning process. Students complete the autonomous learning in the network teaching platform according to the micro-lecture videos teacher preparation before class, and internalize the knowledge through the exploration and practice of project in the classroom. The role of teachers has a great change in the whole process. Teachers become a planner, an active guidance, and students become the real main body who are the operator and the implementation of the task, which maximize the mobilization of the enthusiasm of the students.



**Figure 1.** Framework of blended learning model

Building a blended learning model needs a variety of resource. There are: (1) teachers should both master the literacy ability and IT expertise, and must first work out the corresponding teaching objectives, then set out in detail the knowledge points, provide curriculum instructional videos, course-ware and other types of multimedia teaching resources. (2) The school must have a network-teaching platform, network teaching platform is a carrier of the students, and the students obtain teaching resources through the network teaching platform for learning exchanges [9]. After meeting these resources, the the framework of a blended teaching model-teaching is shown in Figure 1.

#### 3.1.1 Teacher Online Module

The teacher should design teaching activities and teaching resources according to the analysis of teaching objectives, teaching object, and teaching content. The design of teaching activities mainly refers to the assignment of learning tasks, division of learning groups, the establishment of evaluation criteria, etc. Teaching resources can be diversified (video, micro-lecture, PPT). In the process of online teaching, teachers also need to undertake the work of online question

answering and guidance. Students can communicate online with teacher about the problems which they encountered.

#### 3.1.2 Teachers in Classroom Module

The role of the classroom teacher is the organizer, mentors and service providers. Teacher promotes the internalization of knowledge, most of the teachers' work is listening to the students' learning report, watching the work achievements, question answering, discussion, carrying on the thorough exchange. The classroom atmosphere is definitely very active, but the teacher must ensure the classroom discipline. Teachers also supervise the students learning and do quiz record for future reference, and timely feedback between students and exchange. In addition, the teacher must strengthen appropriately the teaching difficulty point or teaching important point.

#### 3.1.3 Students Online Module

Students complete the online self-learning of new knowledge and understanding of knowledge through the online module. Students first receive the teaching task provided by teachers in online teaching platform, then make autonomous learning. If they grasp the new knowledge and

understanding not very good, they can watch the micro-lecture repeatedly. In the learning process they need to actively communicate with the students or teachers, so as to achieve the basic understanding of the course content. They complete the exercise or work on the basis of understanding the course content. Throughout the course of study or practice, students should record the problems encountered in detail. These problems will be solved through the exchange of students or with the help of teacher. This will enhance not only the feelings of teachers and students, but also the ability of cooperation and team spirit.

### 3.1.4 Students in Classroom Module

After online learning, students has a basic understanding of the requirements of the knowledge. Classroom teaching is mainly to carry out the internalization of knowledge. Students can report to the teacher on their own understanding of the knowledge, present their work and other learning outcomes. They feedback the problems to the teacher, the teacher make a

solution to them. Students can also discuss on a certain point of knowledge for deepen learning.

### 3.1.5 The process of blended learning

This teaching mode reform the traditional pattern of classroom teaching and teaching idea. The mode is “learning before teaching”, including “activities before classroom “and “classroom activities” [10]. The traditional classroom knowledge was transferred to complete before class, knowledge internalization after classroom activities originally was transferred to the classroom learning activities. The specific plans of teaching activities are different in the use of flipped classroom teaching mode of different courses. The problem-oriented and task-driven is always emphasized in the teaching activities. The teaching process is shown in Figure 2. As can be seen from Figure 2, during the implementation blended learning, students are the center of the learning process; teachers play a major role in guiding.

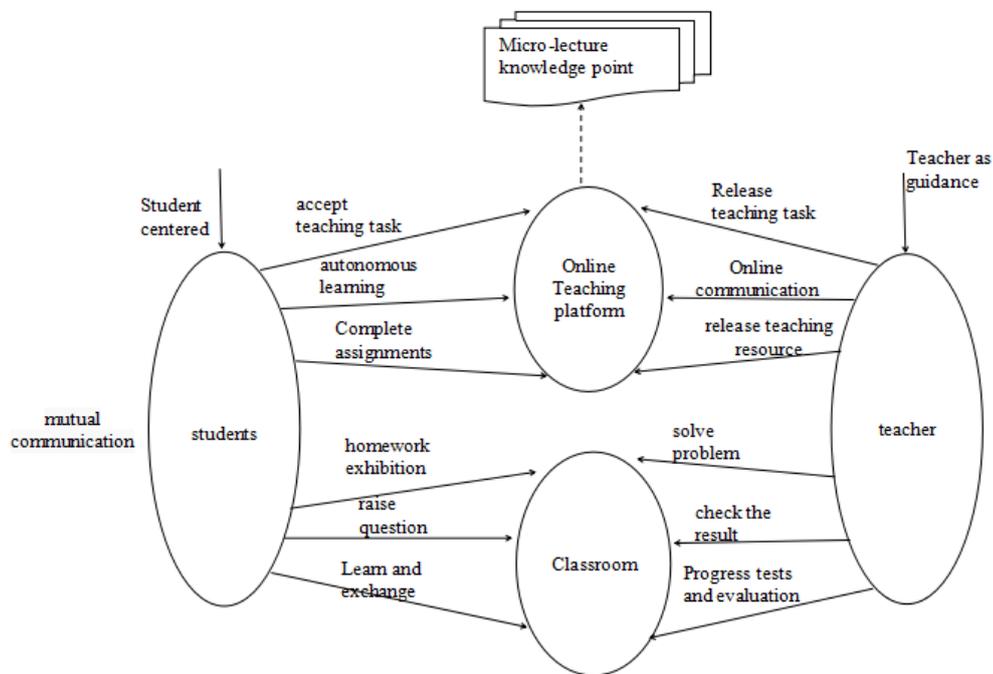


Figure 2. The implementation process of the blended learning

### 3.2 The meaning of micro-lecture

Micro-Lecture is a new method of learning which has developed rapidly in recent years, can meet the demands of E-learning, mobile learning, blended learning, the fragmentation of learning, which is proved to produce huge effect in classroom teaching in the United States. Micro-Lecture takes video as the main carrier, record the whole process of teaching and learning activities which are carried out by teachers revolve around a point of knowledge. Compared with the traditional online courses, the teaching time is short, usually about 10 minutes, no more than 20 minutes, the teaching content is less, resource capacity is small, the theme is clear, and it can improve the students' autonomous learning interest.

Research shows that, students concentrate on learning only 5-10 minutes. Micro-lecture which limits the length of the video in this range can ensure that students pay the most attention to learning content. Moreover, micro-lecture can

make the students focus on a certain topic in a short time, and promote understanding of some key concepts which was difficult [11]. It can improve the teaching efficiency greatly as an important teaching resource. The video of micro-lecture is short, so the way of presentation avoids the students feel boring or unable to concentrate on video learning. The micro-lecture teaching videos become the preferred mobile teaching resources because that it is accordance with mobile teaching idea of leaning “whenever and wherever “. This would solve the concentration problems in the process of students' autonomous learning phase. Micro-lecture is the basis of blended learning, both flipped classroom and MOOC are based on micro-lecture, in some extent they are micro-lecture integration, take micro-lecture as a carrier then through further systematic assembly become a series of courses [12]. The micro-lecture helps students in personalized learning that learners can control their own learning progress according to their own learning style and ability.

### 3.3 Means of the manufacture of micro-lecture

1) Traditional ways of recording, using a camera or classroom equipped with record and broadcast devices, recording the whole teaching process of the teachers, then use nonlinear editing software to clip into one or more productions about 10 minutes of micro-lecture according to knowledge point.

2) Smart phones or other portable terminal. The mobile phone camera function has been greatly improved compared with the past only if being safely operated. Although the effect may be not as good as the professional video camera, it's worth a try for convenience reasons.

3) Use some of the micro-lecture production software. For example, ShowMe, EduCreations, Ex-plain everything and Ask3, etc. They can be used on Ipad for production of micro-lecture. EduCreations also launched PC version, you do not need any cost to complete the production of micro-lecture as long as with a computer.

#### 4) Screen recording software

Requirements for hardware and software of screen recording are very simple, as long as it is provided with a PowerPoint, record screen software (Camtasia studio, Wink, Screen Recorder is the common screen recording software [13]), multimedia computer and the earphone mic. Camtasia Studio is a set of professional screen recording software, with

powerful function of video and audio recording and editing. In addition, the Wink software is particularly worth mentioning, it is a very good free screen recording software, especially suitable for the production of computer operation class. It is free, compact (3MB), can be added sound, pause and jump button, notes in the same period or after, and generate much smaller flash file than the other software. It also has a powerful editing functions: delete the unused frames, plus buttons / notes, add sound. The export file can be a \*.swf format file, or a web page or \*.pdf format file. It is easy to use, only needs a simple computer operation, but I suggest that you try not to use the Chinese mode, otherwise it will inexplicably appeared some problems.

This method has many advantages. The teacher himself does not appear in the video, the audience can only see him in the electronic blackboard writing and drawing. Video can be recorded at any place, the teacher need not consider the personal image, giving lecture without restraint and only focusing on the teaching content. It is particularly suitable for the teaching of computer courses, the operation of the software process, program debugging process can be recorded by recording software. It is economical and convenient, is considered one of the important factors of Khan Academy success.

### 3.4 Process of micro-lecture design

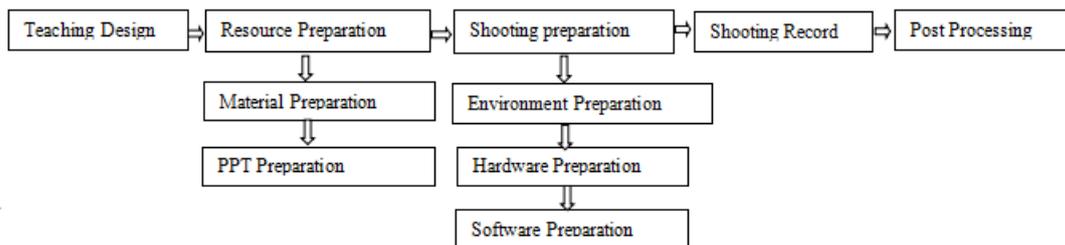


Figure 3. Process of micro-lecture design

Micro-lecture design is a more complex project, it must go through the selection of topics design, shooting record, post

### 3.5 Application example

#### 1) Preview before class

Preview before class is an important part of mastering the knowledge. However, many students do not preview before class, they spend most of their time on mobile phone, computer. Before the course being taught, the teacher should let the students understand the important role of this course in the study of the following courses. At the same time, the teacher should give the students some micro -lecture before each class. The content difficulty should be moderate, students spend very little time but have a preliminary understanding of knowledge to learn.

For example, Variable is a very important knowledge point in the programming. When talking about variables, firstly review Constant and Memory which was learned before so as to master the new knowledge. If we make the contents of the variable into a micro-lecture with animation, sound, it will lead to not only review the previous knowledge, but also preview the new knowledge and make the abstract content becomes specific. Let the students understand that the variable is a container, such as a cup, variable value is the container of

processing, online issuing, and evaluation feedback [14]. The production process of the micro lesson is shown in Figure 3. the specific things, such as the cup of water. The cup can not only be filled with water, but also be loaded with fruit juice. Therefore, in the operation process of the program the value of variable can be changed, while the constant cannot be changed. How to exchange a cup of sugar and a cup of salt water? How many steps should be taken? Whether the procedures are indispensable? Just a few minutes of video makes abstruse concept to understand easily, application of micro-lecture can be more effective, improve learning efficiency.

#### 2) Application of micro-lecture in practical teaching

Practice teaching is an important part of programming, because any program must be run on the computer in order to check the correctness of the program. Therefore, in the course of learning, we must pay more attention to practice on the computer. Practical teaching can develop students' program debugging capability and skills. A teacher often give lecture to about 70 students. Maybe some students cannot catch up with the teacher's ideas, but the teacher can't do one to one tutoring for each student when they encounter problems. Based on this, the teacher can make the typical problem which will be encountered during the practical class into micro-lecture, send to the students in advance, they can also

make some solution to the typical problems which will be encountered in class. Therefore students can watch the operation video while doing practical class, attain half effort and double result.

Micro-lecture can let the students have enough time to accept, they can see clearly each step to come until the subject complete solution come out, they can see the micro-lecture over and over again until they grasp. Micro-lecture provides a new teaching method for the educational institutions and teachers who want to change the traditional teaching forms. In some cases, these micro-lectures are reusable resources, especially those that explain the basic concepts, they can be used by multiple courses and more than one teacher.

#### 4. RESULTS OF BLENDED LEARNING

Blended learning is more effective than purely face-to-face or purely online classes. Blended learning methods can also result in high levels of student achievement more effective than face-to-face learning. By using a combination of online learning and one-on-one face time, students can work on their own and support individual students who may need individualized attention. The results show that: 1) the flipped classroom allowed the instructor to cover more material; 2) students participating in the flipped classroom performed as well or better on comparable quiz and exam questions and on open-ended design problems; and 3) while students initially struggled with the new format, they adapted quickly and found the inverted classroom format to be satisfactory and effective. It can encourage students to become self-learners, students' participation was voluntary. Students were free to participate to the degree they deemed necessary in order to complete the required assignments and pass the course assessments.

#### 5. CONCLUSION AND FUTURE WORK

Practice shows that the blended learning system discussed in this article has a certain degree of success in the application. But the blended learning still belongs to a new thing. The issue is still worth to continue exploring about how to carry out teaching activities effective according to the characteristics of different subject. We believe that with the continuous deepening of exploration and the accumulation of experience, the blending learning based on micro-lecture is getting more and more perfect year by year and play a more significant role.

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#### REFERENCES

[1] Randall S. Davies, Douglas L. Dean and Nick Ball, "Flipping the classroom and instructional technology integration in a college-level information systems

spreadsheet course," *Educational Technology Research and Development*, vol. 61, no. 4, pp. 563-580, 2013.

[2] Carlos Delgado Kloos, Pedro J. Muñoz-Merino, Mario Muñoz-Organero, et al., "Experiences of Running MOOCs and SPOCs at UC3M," in *Proceedings of IEEE Global Engineering Education Conference*, pp. 884-891, 2014.

[3] Gregory S. Mason, Teodora Rutar Shuman and Kathleen E. Cook, "Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course," *IEEE Transactions on Education*, vol. 56, no. 4: pp. 430-435, 2013.

[4] Lage, M., Platt, G. J. and Treglia M., "Inverting the classroom: a gateway to creating an inclusive learning environment," *Journal of Economics Education*, vol. 31, no. 1, pp. 30-43, 2000.

[5] Jon Baggaley, "Reflection MOOC Postscript," *Distance Education*, vol. 35, no. 1, pp. 126-132, 2014.

[6] Zhong Qi and Wu Zhi-Yong, "Research on 'micro-lecture' teaching mode of computer basic courses in college," *Modern Educational Technology*, vol. 24, no. 2, pp. 26-33, 2014.

[7] Xie Qi, Cui Meng-Tian and Zhou Xu-Chuan, "Design and implementation of experiment teaching micro-lecture for C++ programming," *Journal of Southwest University for Nationalities (Natural Science Edition)*, vol. 42, no. 3, pp. 311-317, 2016.

[8] Li Ying, "Research on the application of micro-lecture in the teaching of Fundamental of Programming," *China Computer and Communication*, vol. 3, pp. 252-253, 2016.

[9] Huang Ying, "Micro-lecture a new constructivist teaching means in the era of network," *Journal of Nanjing Institute of Industry Technology*, vol. 13, no. 3, pp. 47-49, 2013.

[10] Jian-yong Lou, Chen Jiang, Pei-rong Zheng and Zhen-pei Huang, "A Research of blended teaching based on the flipped classroom model applies to vocational education -- Experiment in the major of numerical control lathe," *Science Journal of Education*, vol. 4, no. 2, pp. 73-77, 2016.

[11] Michael Horn, Heather. *Blended Learning*, Nie FengHua, Xu Tieying, eds., Beijing: Mechanical Industry Publishing House, 2015.

[12] Dongqin Wu and Xin Chen, "The study of mobile teaching system based on micro-lecture: JAVA flipped classroom for example," *International Journal of Multimedia and Ubiquitous Engineering*, vol. 10, no. 1, pp. 191-198, 2015.

[13] Yin Hong-li, "The design and practice of "flipped classroom" model based on task-driven and micro-lecture," in *Proceedings of International Conference on Education, Management and Computing Technology (ICEMCT 2015)*, pp. 452-1456, 2015.

[14] Xie Li, Xie Lei and Deng Xiaohua, "Micro-lesson design and production of adult mobile-learning-take "Word2010 Mail Merge Application" Micro Class for example," *Science Journal*, vol. 7, pp. 37-39, 2015.