The Study of Mobile Teaching System Based on Micro-Lecture: JAVA Flipped Classroom for Example

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Abstract

With the development of wireless technology, education services through the mobile terminal are emerging. The research on mobile education is getting more and more attention in university. In view of the particular group of college students, this paper combines mobile education with a specific course- JAVA Programming as example, and takes advantage of the new "Flipped Classroom" teaching mode to study how to carry out mobile teaching activity with the use of Micro-Lecture resources on mobile platform. In this article, composition of the mobile teaching system, teaching process and mobile teaching resource construction were also discussed. Teaching practice shows that the study has a positive role in improving the effect of programming teaching and it also be used for reference to develop china's mobile education.

Keywords: mobile teaching system; teaching process; resource construction; Micro-Lecture; JAVA Flipped Classroom

1. Introduction

Mobile education develops rapidly while the application of Internet breaks the bottleneck of wireless. Governments and educational institutions carry out research on mobile education correspondently in each country. As a new stage of distance education, mobile education can improve the present situation of teaching and learning as well as meet the needs of life-long education better. The biggest advantage of mobile education is to break the constraints of time and space compared with the traditional education. Strictly speaking, mobile education refers to teachers and students realize the interactive teaching activity more conveniently in the use of the mobile phone, palmtop computer and mobile terminals, which is based on the mature wireless network and multimedia technology [1].

Mobile education has practical significance only when it was combined with the specific subject teaching. The current content of mobile teaching activities is mainly focused on the presentation of the existing texts, graphics, images, voices, and the classroom recording videos. The way of content presentation couldn't arouse students' enthusiasm for learning, and knowledge itself is a certain lack of structure, so it is difficult for students to complete the meaning construction of knowledge. This paper discusses how to use micro-lecture teaching in the mobile teaching platform with the basic JAVA Programming as an example, and reform the traditional programming in the use of "flipped classroom" teaching model based on the theory of constructivism.

2. The Prerequisites to Develop Mobile Teaching in University

With the development of Internet technology and the mobile terminal equipment, mobile education was provided with the technological foundation. To set up a mobile

platform become possible, personal mobile learning becomes a kind of inevitable need. As a new form of education, to carry out mobile teaching activities should have the following prerequisites.

2.1. Level of Teachers

In the concept of teaching, teachers should change ideas inherent in teaching activities, fully consider students' main body function, and design the mobile teaching resources from the students' point of view. It is necessary to guide and help students to finish meaning construction of knowledge with the aid of the mobile teaching platform. In the aspect of technology, teachers should have the ability of using multimedia, and be proficient in a variety of tools software which is needed in mobile teaching resources construction. In literacy, teachers should also possess the cross disciplines related knowledge in addition to discipline knowledge which is of great advantage to the production of mobile teaching resources and carry out teaching activities.

2.2. Level of Students

In universities, students have a high mobile phone penetration rate and basic knowledge of computer, and they are easy to accept the mobile learning such things, but this is far from enough. From the students' perspective, mobile teaching requires students have the following abilities. In the first place, the students should have the ability of learning and completing the task independently with the use of mobile teaching resources. Secondly, the ability of self restriction is essential. Students can easily be influenced by various factors in mobile teaching activities which will leads to the decrease of the learning effect. So the strong self-discipline of learners is required. Thirdly, students should have the ability of time allocation and management, the application of mobile teaching reallocate the classroom time, leaving the students a lot of independent learning and communication time, so students should try to arrange their time in order to ensure adequate time to learn and complete absorption of knowledge efficiently.

2.3. Management Level

Promotion and development of mobile teaching cannot be done without the support of university management. In addition to give the corresponding policy support and preferential conditions for the construction of mobile teaching platform and mobile learning resources, each universities should also make corresponding adjustment to curriculum arrangement during each semester based on the actual needs, and make sure the students have adequate time to study.

3. Analysis of Related Concepts of Mobile Teaching System

3.1. Micro-lecture and Mobile Teaching

The micro-lecture is also known as micro miniature video courses or micro class. It is the new web-based curriculum resources aim at the knowledge points or teaching steps of a specific subject which support a variety of learning methods with the short teaching video resources as the main carrier. [2] 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. It can improve the teaching efficiency greatly as an important teaching resource.

The micro-lecture is the core resource in the mobile teaching system. The video of micro-lecture is short, so the way of presentation avoids the students feel boring and 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 ".

3.2. Mobile Teaching and Flipped Classroom

To carry out mobile teaching activities the teaching mode must be changed properly. The learning characteristics of college students make the "flipped classroom" become the most suitable teaching model for the mobile teaching. Flipped classroom requires created teaching videos by teacher firstly, students watch video outside the classroom, and then back to the classroom for face to face communication, they sharing, learning achievements and experience, in order to achieve the teaching goal. [3] The combination of flipped classroom and mobile teaching can integrate the "learning" of students and the "teaching" of teachers together which form a complete mobile learning system.

4. Components of Mobile Teaching System

Consideration must be given to students, teachers and educational resources of the three aspects, and combine them organically while constructing a practical mobile teaching system. In general, the mobile teaching system which supports the autonomic mobile learning of students should include the hardware environment, mobile learning platform, and mobile teaching resources of three parts.

4.1. Hardware Environment

Hardware environment on the one hand refers to the need of building mobile teaching server, and enable the mobile teaching server connected to the Internet which store the rich teaching resources and the corresponding service program. On the other hand, the mobile terminal equipment for the learner to participate the mobile teaching activities is required.

4.2. Mobile Teaching Platform

In addition to the general function of user management, resource management and other functions, the JAVA mobile teaching platform also should has the following features. Firstly, it should support the two-dimensional code. Secondly, it should have the adaptive function which can adjust according to the different mobile terminals. Thirdly, mobile learning platform should give full consideration to the psychological characteristics of college students. It should be designed with different preferences according to the individual learning styles and the reaction of learners in different learning environment, and so it can support the personalized settings. Lastly, the teaching platform should have the analysis function of learning situation and give specific learning suggestions for students.

4.3. Mobile Teaching Resources

The mobile teaching resources mainly refer to the micro-lecture video resources and micro-lecture knowledge map which are the two important part of mobile learning platform.

5. Mobile Teaching Resources Construction of JAVA Flipped Classroom

The establishment of mobile teaching resources mainly includes micro-lecture construction and the drawing of knowledge map in the JAVA flipped classroom.

5.1. Production of JAVA Micro-lecture Resources

5.1.1. Explicit Theme and Content: The core composition content of micro-lecture is teaching video which is different from traditional video recording of classroom teaching. A micro-lecture teaching one or two knowledge points, a case or a concept, it can also be a problem solution, teaching reflection, teaching stories and so forth. The theme should be made clear while every micro-lecture was produced. The theme of micro-lecture comes from the basic concept, teaching reflection, difficulty and emphasis in JAVA teaching practice. The content is selected appropriately according to the theme. The idea of teaching students in accordance with their aptitude is also should take into account in the selection of content. Sometimes, a plurality of different micro-lecture should be recorded with a same problem, so the customized micro-lecture can fit different foundation of student.

5.1.2. Make the Present Form Reasonable: From the perspective of resource size, requirements of micro-lecture video length should be short, so as to conform to the cognitive characteristics and learning rule of college students. According to the characteristics of JAVA Programming content, each micro-lecture video length is most no more than 10 minutes. From the resources form point of view, the video format should be made in accordance to which support network online, so students can easily watching online micro-lecture video, look over courseware auxiliary resources flexibly as well as download them saved to the terminal equipment conveniently.

### 5.2. Production of JAVA micro-lecture knowledge map

Micro-lecture is not only the presentation of micro video, but a complete course. Each independent video are not unrelated, the knowledge points exist more or less contact between them. The knowledge points are too many and the difficulty is relatively high in JAVA Programming course, which requires teachers straighten out the relationship between the micro-lecture knowledge and curriculum knowledge system. Teachers should sort the micro-lecture resources to form the structure system and help the students to finish the positive meaning construction from the perspective of knowledge management.

The micro-lecture knowledge map should be made according to the characteristics of JAVA subjects in specific operation. Each micro-lecture knowledge point in an organization presents a semi-structured and subject-based application environment in the map. In the teaching activities, knowledge map class will be made available to students as teaching assistant resources. Students could scan the two-dimensional code to watch the video above micro-lecture corresponding resources while they meet the knowledge points can't understand.

6. Mobile Teaching Process of JAVA Flipped Classroom

"Flipped classroom" 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" two each other to link. 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 of JAVA Programming. The mobile teaching process of JAVA Programming was shown in Figure 1.
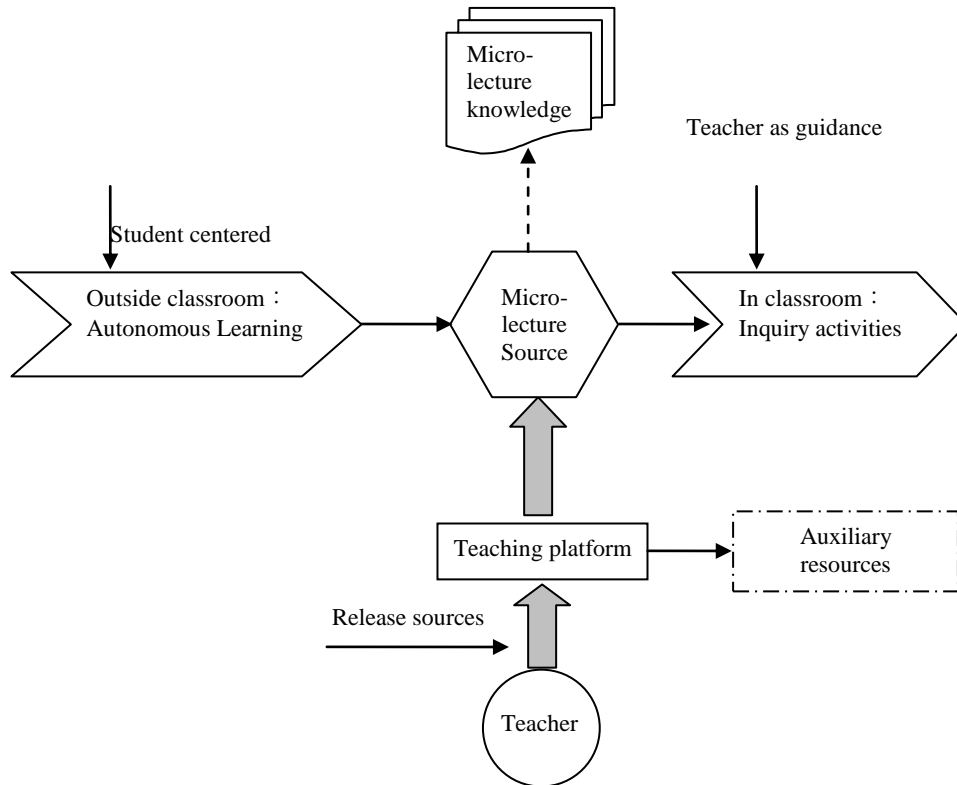
Figure 1. The Mobile Teaching Process of JAVA Flipped Classroom

Students complete the autonomous learning in the mobile 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.

6.1. Learning with Mobile Terminal Outside the Classroom

In practice, the students log in mobile teaching platform, visiting JAVA micro-lecture resources teachers have prepared, complete the autonomous learning through the mobile terminal, as well as completed acceptance and understanding the process of knowledge. During this process, the students watch the teacher's teaching video, jotting question encountered, and then do some advanced tests. Students could ask for help from classmates through the assistant management platform on mobile learning platform when some problem they don't understand. If the question still can not be solved, students could down to the class for discussion.

Teacher should provide introduction video before the start of each micro-lecture in order to ensure the students carry out autonomous learning effectively. With the help of introduction part, the students could understand the teaching activities better. At the same time, the teacher should put forward the content requirements of what students must be completed in a period of autonomous learning part. Students can control of the rhythm of their learning ability, and learn easily in the mobile environment according to their learning ability.

6.2. Inquiry of JAVA Project in the Classroom

The task of classroom activities is to complete the process of knowledge digestion and absorption. Classroom activities were arranged in computer room according to the practical features of JAVA programming. Firstly, teacher explains most of the content which students puzzled in a short period of time during the classroom activities, and review of knowledge through simple practice. Then the teacher should designated a given task, the students discuss the solutions and ideas and programming to solve it. Teacher works as a leading role who guide the students to internalize knowledge through other activities, such as classroom discussion, inquiry experiment and project based learning.

In the process of teaching, teacher should select appropriate instance of JAVA project according to the JAVA knowledge points students have learned in the micro-lecture. While select the project task, considering the background knowledge and students agree, so as to fully realize the use of the knowledge of students, the difficulty level to the students is too high or too low relatively has negative influence in teaching. Take the micro video "JAVA layout manager" knowledge as example, and teacher selects a small program of "Windows calculator" as classroom practice case. Students discuss the case orderly and corporately, obtain the solving approach of problem and solve it in programming in the end.

6.3. Evaluation and Communication of Results in Mobile Teaching

Teacher should give a comprehensive analysis for the student according to the progress of learning, the completion of basic knowledge questions and learning habits. On the basis of it, teacher gives positive suggestions and specific guidance in mobile teaching activities. At the same time, exchange activities of JAVA Programming design achievement should be carried out. In these activities the students could develop project results, results of exchanges, and mutual evaluation. Teacher pointed out the bugs may exist of the project, and make into a micro-lecture. Some students that learning ability is weaker could learn repeatedly, strengthening the knowledge absorption process through .the mobile terminal.

7. Conclusions

It is of great significance to carry out mobile teaching activities on the mobile teaching platform with the help of flipped classroom teaching mode. The mobile teaching combined with the specific course of JAVA Programming and micro-lecture as the core in it. Practice shows that the mobile learning system discussed in this article has a certain degree of success in the application. But the mobile education still belongs to a new thing. The issue is still worth to continue exploring about how to carry out mobile teaching activities combining according to the characteristics of different subject.

Acknowledgements

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