Teaching Reform and Practice in the Course of Plant Tissue Culture

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Abstract—Plant Tissue Culture is an important comprehensive course in plant protection, biotechnology and biological sciences. Because the course is complex, descriptive and abstract, students often feel boring and difficult to understand the contents. In the teaching practice of the course, the teaching content can be enriched with the addition of micro-video teaching in a timely, increasing the interest and knowledge of the course. In addition, the enthusiasm of the students to listen to the class will be fully mobilized, and enhancing students' understanding and mastery of the relevant professional knowledge of the course. The advantages of micro-video teaching were summarized in this paper, and some problems that should be paid attention to when applying micro-video teaching were also pointed out. The results in this paper will lay a theoretical foundation for further application and promotion of this method.

Keywords—Micro video; Teaching reform; Plant tissue culture

I. INTRODUCTION

The Plant Tissue Culture course is a professional optional course in plant protection. The aim of this course is applying the principles and methods of cell biology and molecular biology to study the transformation of biological genetic characteristics at the cellular level to obtain plant cell lines or organisms with targeted traits.

The main contents of Plant Tissue Culture include tissue culture laboratory and basic equipment, basic principles, plant organs, tissue culture and rapid propagation, virus-free seedling cultivation, cell culture, protoplast isolation and fusion, germplasm conservation and exchange, and so on. It is the application of the principles and methods of cell biology and molecular biology to isolate the desired organs, tissues or cells (including protoplasts) from plants as explants under artificial control conditions. It is multidisciplinary in theory and practice.

Because the course of Plant Tissue Culture involves a wide range of content and is multidisciplinary, if we only use the traditional teaching mode (writing on blackboard), students may have difficulty in understanding and mastering the contents of this course, and the classroom teaching effect may be poor. At the same time, because the theoretical and experimental teaching conditions among the various universities in China and the teaching levels of the teachers are very different, the teaching effects may also be significantly different. Therefore, it is necessary to reform the teaching of this course, and apply new teaching methods to improve the teaching effect. With the rapid development of network technology and multimedia technology, multimedia teaching methods were widely used in teaching practice of many disciplines [1,2], and the application of micro-video teaching was also applied more and more generally.

Micro-video is composed of sound and continuous pictures. This way of expression can achieve the effect of sound and emotion, which can overcome the problems of single teaching methods and difficult interpretation of abstract content with traditional teaching methods [3-5]. Micro-video teaching is an important supplement and change for the teaching method and has become an important part in teaching reform [6]. In addition, micro-video was made up of sound and continuous pictures, and the vivid performance of it could be achieved spontaneously [5]. The disadvantages of traditional teaching methods, such as monotonous and abstract, could be overcome via the application of micro-video teaching. Hence, micro-video teaching was an important supplement and innovation in teaching methods, also an important part of teaching reform [6, 7]. Therefore, based on the teaching of the course for many years, the micro-video teaching method was applied into the teaching of Plant Tissue Culture course in the present study, and the construction and reform of the course were explored in order to achieve better teaching results. The advantages of micro-video applications and some problems that need to be
noticed were summarized in this paper, laying the foundation for further promotion and application of this method.

II. ADVANTAGES OF MICRO-VIDEO TEACHING

A. Micro-video Teaching Can Display Knowledge Points in a Real and Vivid Way

First of all, micro-video is composed of continuous pictures and language dialogues. This way of expression is more vocal. In traditional teaching methods, students can only listen to the teachers alone. Micro-video can make students observe the real scene. And learning in this new way is more conducive to students’ understanding and strengthening of memory. For example, when we explained the occurrence and formation of callus from plant explants, if only adopted oral presentations by the teachers, the students could not have a deep understanding and impression of the formation process of callus from plant explants. The videos allowed students to see the whole process of callus formation from explants, and know about the process of dedifferentiation of cells. Through this kind of micro-video learning, combined with the teacher’s proper explanation, the students will have a deeper intuitive understanding of the contents, so better teaching results will be achieved subsequently.

B. Micro-video Teaching Makes the Contents More Accessible and Easy to Understand

Micro-video teaching is an organic whole of video and sound combination [8]. It is displayed in a dynamic form. It not only has rich and colorful images, but also includes detailed explanations about contents, which makes the original boring knowledge easy to be understood by the students. What’s more, some of the keystones and difficulty of this course will also become more acceptable and clarified by students. For example, the knowledge of the types of explants in the Plant Tissue Culture course was cumbersome and difficult to remember quickly, but if we applied the micro-video teaching, we could make students quickly master the types of explants and remember their respective characteristics. This was because through the introduction of video clips, students could not only see the morphological characteristics of various explants, such as size, source and color, but also could hear clear and concise explanations to elaborate on the types, source and use of various explants. Compared with traditional teaching methods, the expression of images and sounds in micro-video teaching is more intuitive and vivid, making the original obscure teaching contents becoming easier to be understood and accelerated for the students.

C. The Making Levels of Multimedia Courseware Could Be Observably Improved by Using of Micro-video Teaching for the Teachers

With the popularity of the Internet, teachers can collect and download the various micro-video resources needed for teaching from the Internet. When making the multimedia courseware used in the process of micro-video teaching, the teacher only needs to use the network to retrieve the required video resources and then uses the simple download technology to download the courseware to make the courseware. However, the making process of Power Point (Slide teaching) might be reasonably tedious, teachers needed to type the teaching content verbatim, edit text, and design the layout and divisions. Micro-video teaching could provide a new way for multimedia courseware for the teachers which were unfamiliar with making Power Point. In addition, multimedia courseware made by using micro-video resources was a digital teaching material that could be preserved for a long time. Through constant updating and accumulation, some teachers could create their own micro-video resource library for other teachers in the whole school to improve the overall courseware levels of Plant Tissue Culture.

D. Micro Videos Cover More Learning Contents in a Shorter Time

As the Ministry of Education in China puts forward new requirements for the teaching of university courses, it emphasizes that it is necessary to reduce the time of class, so that students have more time for self-learning and the amount of knowledge that students can acquire independently. Our school has reduced the theoretical course of the Plant Tissue Culture course from 56 to 40 hours, which requires teachers to teach the main contents to students in less time, but if traditional teaching methods are still used, it will lead to the slow speed of teaching knowledge, little amount of knowledge in a lesson and the outdated knowledge of teaching contents. How to teach more knowledge in the lesser hours of learning is a big and urgent problem faced by the teachers in the course of Plant Tissue Culture, but if we utilize the method of micro-video teaching, this problem can be solved automatically.

Because micro-video has the characteristics of short refinement, it can cover more learning contents in a shorter period of time. And it is also possible to incorporate similar aspects, such as major historical events in the development of plant tissue culture, famous experiments, key figures, and so on. Furthermore, in the process of learning, some professional vocabulary will appear, which broadens the scope of the knowledge for the students. At the same time, micro-video teaching does not take up too much classroom time, but it can contain a wealth of knowledge. For example, application of micro-video teaching could bring the latest research progress of plant tissue culture from different countries in a short period of time, so that the latest and most abundant knowledge information could be quickly shared to students, and the students’ views can be expanded markedly. The students’ curiosity could be fully stimulated, so the teaching efficiency of the course is bound to be significantly improved, and better teaching results can be obtained spontaneously.

III. MATTERS NEEDED TO BE PAID ATTENTION IN THE PROCESS OF MICRO-VIDEO TEACHING

A. The Amount of Micro-video Teaching in Each Class Should Not Be Too Much

Teaching in classroom is a cognitive activity. Its distinctive feature is the need to interact with teachers and students, so that students can understand and master a certain knowledge point. In the process of micro-video teaching, some teachers play too many micro-video resources, and sometimes even use the
entire class time to let students watch micro videos. For example, some teachers just sited on the platform and clicked the mouse to play micro videos one by one. The teaching of the preparation process of the culture media had completely become a video lesson. Students could only passively watch these micro videos when they encountered the questions, which were not understood fully during the preparation process of culture mediums. Because the micro videos were constantly playing, the teacher does not answer their questions in time, so that the problems they do not understand were accumulating, and finally the students might lose interests in learning. Generally speaking, the number of micro videos played in a class should not exceed three. After each micro video is played, it should stop for a few minutes, and give timely explain of the key points and difficulties for the students, and then give the content according to the micro videos. Students can ask questions to take the initiative to participate in the discussion of micro-video teaching contents, so that students will become initiative from passive recipients in gaining information and constructing knowledge system.

B. Micro-video Teaching Needs to Be Combined with Blackboard and PPT Courseware

In the process of playing micro videos, if we only play videos and lack the necessary writing on the blackboard or PPT explanation, it may be difficult for students to understand and grasp the core and essence of the teaching content directly from the videos. In fact, although many students had been watching micro videos, they often feel that they didn’t get much knowledge. Therefore, teachers should combine the micro-video playing with the blackboard or PPT courseware as a complete teaching process in the curriculum of Plant Tissue Culture, including micro-video contents related to the specific practice process in plant tissue culture. Detailed writing on the blackboard and PPT courseware demonstration making the key points and difficulties prominent are easy for students to understand and master, so that the purpose of enhancing teaching effect can be achieved.

C. Paying Attention to the Quality of Micro-video Teaching Resources

Although micro-video teaching has a positive effect in the teaching process of Plant Tissue Culture, some teachers can't effectively master the information technology, and can't validly use the Internet to gain massive information and obtain suitable micro-video teaching resources. Those may lead to bad results. For instance, the acquired micro-video teaching resources are small quantity, the update of micro-videos is not timely, and the theme is not clear enough. At the same time, they can not properly adjust and produce the obtained micro-video resources, which can't be well used in the teaching process. Moreover, resources may not be consistent with the teaching contents. In addition, some teachers are still not able to switch between PPT courseware and micro-videos in the process of teaching, resulting in the whole class being flat and straightforward, the connection of contents is incoherent and relatively boring. Thus the effectiveness and quality of teaching are seriously affected. Therefore, the teaching unit should strengthen the pre-job training of teachers, and improve the ability of teachers to use information technology. Teachers should pay attention to the quality of micro-video resources, and also attach importance to the exchange and sharing of micro-video resources among colleagues, and collect micro-video materials related to the content of the Plant Tissue Culture course through various channels and ways

IV. SUMMARY

In summary, the rational use of micro-videos in the teaching practice of the Plant Tissue Culture course can increase the increases of the course knowledge and enhance the students' enthusiasm for learning. Through the organic combination with traditional teaching methods, the quality and effectiveness of teaching can be significantly improved; in addition, micro-video teaching can vividly display contents, and students' interest in learning will be greatly stimulated. If teachers can properly combine teaching objectives in teaching practice and choose reasonable micro-video resources, they can give full play to the advantages of micro-video teaching, meanwhile the creative thinking and active learning ability of students will be well cultivated, and better teaching results will be achieved subsequently. As an open information carrier, micro-video teaching is introduced into the teaching of Plant Tissue Culture in our classes. It is a new attempt and experience and needs to be combined with conventional teaching methods. By continuous exploration and application, we can improve the teaching effect in the curriculum of Plant Tissue Culture.

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