

On the Effective Integration between "Micro Lecture" and Experiment Teaching of Instrument Analysis in Local Colleges and Universities from the Perspective of Innovation Education

Jing Liu, Yonghui Shang, Jianbo Liu, Yan Chen and Ping Zhang

ABSTRACT

The core issue of higher education reform is to train and bring up high-quality talents with innovative spirit and innovative ability. In view of the present situation and existing problems of instrumental analysis experiment teaching in local colleges and universities, the Micro lecture is introduced into the experiment teaching to help preview before class, to realize the mixed “interactive and dynamic opening teaching mode” in class, to synthesize and design the experiment teaching, and to open laboratory after class. This multi-level innovative experiment teaching mode enables students to master the correct use of instruments, standardize the experiment operation techniques, and improve the quality of experiment teaching.¹

INTRODUCTION

Innovation and entrepreneurship education are the main contents of modern education in the new situation. Strengthening innovation and entrepreneurship education is the main measure to realize the reform of education and teaching. It aims to cultivate students' innovative consciousness, pioneering spirit and innovative entrepreneurial ability through teaching and practical activities [1].

¹Jing Liu, Yonghui Shang, Jianbo Liu, Yan Chen, Ping Zhang, Xianyang Normal University, College of Chemistry and Chemical Engineering, Xianyang, China. 712000.

Instrumental analysis experiment is a fundamental course required for chemistry and chemical engineering, and is an important part of instrumental analysis courses. As the course involves a wide range of contents and instruments, it is quite abstract and difficult to understand. Combined with the high cost and supply limitations on equipment, it has been a more difficult subject in college teaching [2].

With the progress of the times and the development of information technology, the traditional teaching mode has struggled to meet the requirements of cultivating innovative talents. The “micro lecture” makes up for the inadequacy of the traditional experimental teaching for abstract contents and details, and brings hope for the reform and innovation of the teaching methods. The paper will introduce the practice and lessons of some innovative teaching methods in combining traditional teaching modes with modern educational technology, integrating with instrumental analysis experiment teaching in local colleges and universities.

THE DISADVANTAGES OF TRADITIONAL TEACHING OF INSTRUMENTAL ANALYSIS EXPERIMENT

For local colleges and universities, especially the newly established ones, there are many problems in the teaching methods.

Insufficient teaching funds; insufficient preview before the experiment class; the outdated teaching methods; Traditional class explanation is difficult to meet the needs of personalized learning; there are more confirmatory experiments, but fewer design and innovative experiments. Students are poor in comprehensive quality and practical ability. Hence, it is urgent to make a reform in instrumental analysis experiment teaching and improve the quality of experimental teaching.

THE IMPORTANCE OF MICRO LECTURE APPLIED IN INSTRUMENT ANALYSIS EXPERIMENT TEACHING

Micro lecture is mainly in the form of “short but informative” teaching videos and a new teaching method which combines traditional teaching activities with modern technology [3]. Micro lecture is the concentration of teaching resources, which integrates video, animation, and pictures to attract the eyeballs of the learners in a short time. It can be accessed through a variety of terminals to realize mobility learning and facilitate students to select teaching resources individually. Therefore, the auxiliary teaching is more specific and perfect. Especially in the teaching of instrument analysis experiment, the Micro lecture is introduced to transfer the teaching contents with pictures and audios to present the internal instrument structure, the principles and the determination process in front of the students. Since it can be seen and heard vividly, for students, a strong interest and enthusiasm for learning will be aroused and they will more consciously explore the knowledge. Finally, the quality of experiment teaching will be improved [4].

ON THE EFFECTIVE INTEGRATION BETWEEN "MICRO LECTURE" AND EXPERIMENT TEACHING OF INSTRUMENTAL ANALYSIS IN LOCAL COLLEGES AND UNIVERSITIES

Pre-Class Preview Represented by Micro Lecture to Improve Experimental Results

Aimed at the complex structure and the operative difficulties of analytical instrument, teachers will elaborately make the micro lecture video, flash animation to explain, according to the teaching requirements, the experimental standard operation, the instrument and its components with the assistance of PPT as well as on-site presentation. Through partial enlarged view, angle switching, repeat play and other methods, the micro lecture will present the instruments' structure, principle, and operational process to students. At the same time, it will describe the components and functions of the instrument step by step to make the students see clearly the details of the experimental equipment and the operations. Furthermore, teachers will make the teaching material public on the network platform. By doing so, students can preview in advance. Before the lab class, questions will be asked based on the preview content including the principle and influencing factors of the experiment to inspire the students to find out the key to the success of an experiment. Students can also ask questions to ensure the smooth running of the experiment.

The Implementation of "Interactive and Dynamic Open" Mixed Teaching in Class to Improve the Capacity of Practical Innovation

It is difficult to guarantee every student does the experiment due to the limited number of experiments and the large number of students. According to the actual situation, teachers compress theory hours, write experimental textbook and adopt the method of circulation experiment with pairs work to ensure everyone does the experiment independently. Before the operation, students will be divided into laboratory groups and 10 minutes will be given for communication and discussion. By doing so, it can enhance students' understanding of the instrument by combining the perceptual knowledge with the real objects. Meanwhile, with the audio-video contents as a guide and the existing knowledge as the basis, students can solve the design philosophy, experimental method and so on in preview through discussion.

In class, the "dynamic open" teaching mode will be adopted. Let students operate independently: prepare their own reagent, calibrate solution concentration. Truly achieve the student-centered individualized teaching and independent learning. At the same time, teachers should play a leading role and give timely corrective experimental operations. Teachers and students can interact with each other at any time to solve the problems in the experiment, analyze the rationality of the experimental results and assist students to obtain reliable experimental data. This interactive and dynamic open teaching mode can full play the main role in students,

arouse their learning interest, expand their knowledge, also can give them a chance to master experimental skills and improve their ability of practical innovation.

The Integrated and Designed Experiment Teaching of Micro Lecture can Stimulate Student's Experimental Interest

The traditional instrument analysis experiment only focuses on the verification experiment but it neglects the cultivation of students' ability. Now some comprehensive experiments of application close to production and life are added to the highly developed precision instruments, such as the experiment of determination of copper content in wastewater by atomic absorption method; the content of riboflavin in vitamin B2 determined by fluorescence analysis; the experiment of determination of trace elements in water on the market by ICP atomic emission.

Combined with theoretical study, some design experiments are set up. First, the teacher record the purpose, principle and specific requirements of the experiment into a micro lecture of no more than 10 minutes and post it on we-chat. Students communicate and discuss in groups, consult literature, research and design plans independently. Students can discuss with teachers and optimize the experimental program, at the same time repeat the trial lecture under the guidance of the teacher. In the experimental class, each group report own design scheme and has 5 minutes' defense. Finally, independent experiments were carried out according to the optimized experimental scheme. The practice shows that the method reverses the previous experimental teaching mode and students can easily complete experimental design and basic skills knowledge outside the classroom. The lab becomes a place where teachers and students interact with each other and students interact with each other and eventually complete the experiment. In the process of integrating knowledge, ability and quality, students are motivated to learn and explore, and their eloquence is trained to lay a solid foundation for future work.

Open the Laboratory after Class to Cultivate Students' Innovative Consciousness and Scientific Research Ability

In addition to increase the proportion of application, design and comprehensive experiment in classroom teaching, more importantly, the laboratory should open to students at different levels to let the students use their spare time to complete some interesting experimental projects in the open laboratory. Encourage students to take an active part in the research work of teachers, apply their knowledge to practical use, and stimulate students' interest and innovative consciousness in scientific research. Through the "Innovation and Entrepreneurship Program for College Students" and the Chemical Skills Contest, attract students to participate in experimental projects, strengthen experimental skills training. Let the students be familiar with and have a chance to use all sorts of experimental instruments and equipment at any time. Moreover, provide students the condition for practical

learning, give full play to the role of existing resources of the laboratory, and improve the utilization rate and service efficiency of instruments and equipment [5].

CONCLUSIONS

In summary, the combination of micro lecture under the concept of innovation ability cultivation and the experimental teaching of instrument analysis in local colleges and universities can reduce teaching burden. At the same time, it can improve students' interest in learning, strengthen the communication and interaction between teachers and students, improve students' autonomous learning ability, and hands-on ability in experiment operation. And it truly reflects students' main role and teachers' leading role. It is more beneficial to cultivate students' innovation ability and improve the quality of experimental teaching. However, we are fully aware that it is still in the experimental stage to implement the teaching mode of micro lecture in the experimental class of instrumental analysis. There are also some problems that should not be ignored. How to improve the micro-course teaching, more efforts should be paid to continue exploring and practicing!

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