

Case Based Interactive Class Teaching Mode for Graduate Students

Yi Yang and Dekuang Yu

Southern Medical University, Guangzhou, China

Email: {yiyang20110130, yude}@163.com

Abstract—Interactive teaching is helpful to cultivate the innovative and exploration spirit of postgraduates, because this teaching method has the characteristics of student-oriented, open and equal, facing challenges, learning care, and questioning encouraging. With consideration of the teaching characteristics of the courses, this paper introduces a case-based interactive class teaching mode between instructors and students, and expounds the specific methods of teacher-student interaction, focusing on the case analysis and interaction methods such as heuristic teaching, question and answer mode, and inquiry experience type. Activation of innovative thinking and exploration is the soul of interactive teaching. Teaching based on recessive knowledge often leads to "rich and full" class, which can promote the cultivation of innovative thinking, and promote the course teaching capability to a higher level.

Index Terms—Case analysis, graduate courses, heuristic question and answer mode, interactive class teaching

Professional core curriculum is the premise and foundation of postgraduate research. Professor Burton Clark, a famous expert in Higher Education [2], pointed out: "when universities are first understood as the place of inquiry, research and teaching activities are not only interpenetrating, but also compatible in essence." This teaching reform attempts to start with the core courses of graduate students, and introduce the teaching concept of "promoting research by learning" into the teaching practice of core courses of postgraduate majors, that is, in the course learning link, students are allowed to receive systematic scientific research training and learn the basic methods of scientific research, so as to change the current situation of insufficient cultivation of innovation ability in the existing curriculum links. Through the practical training of the course, gradually enhance the students' innovative consciousness and tap their innovative potential.

I. INTRODUCTION

Postgraduates are important undertakers and new force of national science and technology innovation, and the cultivation of innovation ability is the core content of engineering graduate education. Graduate education is the main way to cultivate high-level talents and an important part of the national innovation system. On the basis of consolidating and deepening the basic theory and professional knowledge, the postgraduate course teaching can cultivate the students' ability of autonomous learning, raising and solving problems, and gradually develop their scientific inquiry spirit and independent innovation consciousness.

Course teaching is among the necessary components in postgraduate training. Graduate course teaching runs through the whole education process, which is regarded as one of the most important means to achieve the goal of personnel training, the basis for graduate students to master professional basic knowledge, the theoretical reserve for scientific research, and the necessary steps to guarantee the quality of graduate education [1]. It plays a wholesome, comprehensive and fundamental role in the growth of graduate students. Therefore, colleges and universities should lay comparable weight on teaching as on scientific research cultivation of graduate students, and make great efforts to strengthen graduate course teaching.

II. INTERACTIVE CLASS TEACHING AND POSTGRADUATE TEACHING REFORM

A survey on graduate teaching in China shows that "the current curriculum and teaching mainly ignore the cultivation of students' ability to discover problems, design research plans and solve problems. And the above three abilities are just the core elements of the research. The hidden reasons lie in that the course resources of graduate students are not rich enough, the contents are low-level duplication with undergraduate students, the course learning is mainly taught by teachers, and the assessment of professional courses is lack of process evaluation. This kind of teaching is obviously not beneficial to the cultivation of graduate students' research consciousness and spirit of inquiry and innovation.

Although the "interactive class" originated from American secondary education, it is highly consistent with the fundamental requirements of graduate teaching reform in China from the perspective of concept connotation.

It is a change of teaching concept. In the traditional teaching concept, instructors are the embodiment of knowledge and have absolute authority in the teaching process. Students can but only obtain knowledge from their teachers. Students should accept as much as instructors' input. Students' cognitive level depends on teachers' knowledge level [3]. Interactive class changes teachers' and students' views on knowledge and teaching. With the development and popularization of information

technology, the access to knowledge has been widely diversified in the recent years. The lecturing teaching is by far not the only learning channel. The network channel provides marvelous enormous resources for students to learn. The rapid update of knowledge also makes it increasingly evident that instructors are no longer the authority of knowledge. Students may also have the ability to obtain more learning resources on their own efforts and form the initiative capabilities. There comes the trend of interactive process of teaching and learning.

It is a change in teaching methods. The traditional teaching method takes classroom as the position and the teacher's systematic teaching as the basic teaching method. This kind of teaching restricts students' independent thinking and autonomous learning, and the effect of teachers' teaching is not satisfactory. Interactive class provides a new teaching paradigm, which combines monotonous teaching method with various and abundant learning activities, learning and thinking, teachers' teaching and students' learning. Reading, questioning, discussion, sharing and speculation emerge as the new teaching forms [3]. Students can fully study independently in the new circumstances.

It is a pursuit of teaching effect. The personnel cultivated in today's society should be with quality of innovative consciousness and innovative ability. It is difficult for traditional teaching to cultivate innovative minds. Innovation of interactive class affects from the teaching concept to the teaching methods, to adapt to the requirements of new talent training objectives. Under the teachers' guidance, students' autonomous inquiry learning can not only fully understand knowledge, but also cultivate their research consciousness and spirit of seeking, and adapt to their personality development. Compared with the traditional class teaching, interactive class is more conducive to the development of students' various abilities and achieves the ideal teaching effect.

III. GRADUATE TEACHING REFORM BROUGHT BY INTERACTIVE CLASS TEACHING

The introduction of interactive class teaching into graduate teaching in China's colleges and universities not only needs to make it adapt to the national conditions, but also break down the barriers of our own thinking, behavior and formulation, and make corresponding changes.

A. *The Change of Teaching Concept and Behavior between Instructors and Students*

For instructors, first of all is to change their teaching concept. Instructors should abandon the traditional ideas of knowledge authority and overall classroom control, attach importance to the status of students' learning subject, act as learning guide rather than knowledge imparter. They should take the cultivation of students' autonomous learning and research ability as the teaching goal, fully understand the ideological connotation of interactive class teaching mode, and combine it with graduate teaching. Second, instructors should have a more solid foundation of professional knowledge, be able to timely understand the latest cutting-edge trends of disciplines, and broaden their

knowledge to provide students with rich curriculum resources [4]. Third is to have strong ability of classroom design and management, that is, to design the teaching content of the subject as a whole, to arrange the course teaching carefully, to organize and mobilize the self-study and classroom discussion of graduate students, and to master the application of modern educational information technology to teaching.

For graduate students, interactive class transmission to them the idea of the main body of learning active learning, as well as the concept of combining knowledge learning with inquiry, which requires them to spend more time and efforts in learning. They should form the ability of self-study and problem analysis, and master the use of modern network technology to obtain knowledge and information. It can be seen that interactive classroom changes not only teaching methods, but also a new challenge to Instructors and students' teaching concepts and behaviors.

B. *The Reform of Class Teaching Mode and Conditions*

Although the interactive class teaching is positioned as "classroom", it is a broad sense classroom covering both in class and after class. Specifically speaking, interactive classroom is the combination of "pre class learning + Classroom exploration"[5]. Instructors should not only organize teaching activities in class, help students understand the learning content deeply by answering questions and organizing discussions, but also design activities for students to preview beyond class. Interactive class teaching requires Instructors to design the whole teaching process. The teaching methods mainly include self-study, practice, explanation, communication and cooperative learning.

The interactive class teaching mode also has higher requirements for teaching conditions. The class teaching of graduate students should be equipped with multimedia facilities to ensure the network connection and wireless coverage of graduate classroom. In the interactive class teaching, "micro video" is an important course resource in the interactive classroom. Instructors can not only make power point and record the knowledge content, but also provide some other online course videos in advance and put them on the network communication platform to provide students with self-study. It is necessary to build a smart learning space to meet the needs of students' online learning and visual management.

C. *The Reform of Teaching Evaluation Standards and Methods*

Interactive class teaching is concerned about the students' status and role of learning as well as the cultivation of students' various aspects, including their learning attitude, learning ability, learning methods and acquired knowledge and skills. In graduate teaching, the implementation of interactive classroom is the cultivation of the learners' comprehensive quality. It needs to change the traditional single summative evaluation method and the evaluation standard with knowledge assessment as the main content. Process evaluation should be combined with the end evaluation, and the assessment criteria should be

diversified, such as the pre class preview, self-study effect, literature retrieval ability; the status of participating in discussion in class, answering and questioning questions to questions, cooperative learning in groups; the completion of learning tasks after class, comprehensive innovation ability and final assessment. The assessment methods can be papers, assignments, discussion outlines, classroom speeches, research reports, examination papers, etc. Interactive class teaching also puts forward new requirements for teacher evaluation, which should be combined with the teaching process to comprehensively assess teaching design, the provision of curriculum resources, the organization and mobilization ability of class teaching, teaching attitude and academic level.

IV. CASE BASED INTERACTIVE TEACHING CONCEPT AND METHODS

Case teaching is the summation of a series of teaching methods in which educators introduce learners into the situation of educational practice according to certain educational purposes and take cases as basic teaching materials. Through multi-directional interaction, equal conversation and active discussion between instructors and students, students can improve decision-making ability and action ability in the face of complex educational situations [6]. Case teaching is highly praised in American professional degree education.

In the classroom, instructors convey their own understanding to students in easy language, so that students can master more knowledge in a short time. The best and most effective way of teacher-student interaction is to inspire and induce. Instructors do not directly explain the concept and theory of the course, but start from the knowledge that students are already familiar with, and gradually guide students to get new knowledge and new theory by asking questions, which is also called heuristic teaching method [7]. This interactive teaching method has a long history and is a good teaching concept. It can not only inspire students' interest, but also inspire students' imagination, so as to cultivate students' creative thinking and ability, which is the source of new ideas and theories. Therefore, the heuristic interactive teaching method has been paid attention to and respected by instructors all the time.

Case teaching is a bridge between theoretical knowledge and practical activities. Through case presentation, case discussion, situational practice and practical experience, case teaching for professional degree postgraduates transforms declarative knowledge into acquisition rules in stages and forms explicit behavior, which contains the transformation process from declarative knowledge to procedural knowledge, which can effectively shorten the theory and Practice The distance between practice.

A. Case Presentation and Problem Situation Creation

The case itself is a kind of "specialized, well organized and descriptive knowledge"[8]. Teachers' presentation of teaching cases, in fact, is to create a cognitive, practical, cooperative problem situation. This kind of problem

situation enables graduate students to enter the virtual simulation practice situation, understand the practice environment and its various constraints, master the various practical rules that constitute the behavioral relationship between participants, recall and mobilize the declarative knowledge hidden in the practice situation, and understand the practical significance of relevant concepts, rules, facts and action steps in the virtual situation. Integrating situational teaching into the cultivation of graduate students can effectively shorten the distance between the teaching content and the practical experience and acceptance ability of students, so as to achieve the goal of cultivating students' practical ability [9]. therefore, the presentation of teaching cases and the creation of practical situation can put the professional degree graduate students in the practical mood of integrating declarative knowledge and procedural knowledge, activate and mobilize declarative knowledge, prepare for the transformation of declarative knowledge into procedural knowledge, and form students' practical thinking and ideas.

B. Case Discussion to Provide Solutions

On the basis of the previous stage, graduate students have a certain understanding of the teaching cases presented by teachers, and to a certain extent activate and mobilize the static declarative knowledge stored in their minds. At this time, the teacher puts forward the discussion question combined with the case, and guides the graduate students to carry out the case discussion on the case problem. Case discussion is divided into intra-group discussion and inter-group discussion. No matter what form, this discussion and communication with other learners can mobilize the existing declarative knowledge of graduate students, realize the collision between declarative knowledge and activate declarative knowledge. Through case discussion, graduate students can participate in problem solving, clarify the application conditions of declarative knowledge, and promote the "procedural" of declarative knowledge. Students' participation in problem solving is helpful to the transformation from declarative knowledge to problem-solving procedural knowledge. [8] In the process of case discussion, through the common communication between students and teachers, students constantly find out the various application conditions required to solve a certain problem or complete a certain task, try to solve the case problem and provide solutions, complete legal participation, and master "technical knowledge".

C. Situational Practice to form Explicit Behavior

Graduate students' situational practice can be carried out in the form of role-playing in the classroom, or in the form of virtual simulation and situational experience in the training room or even the practice base. The process of situational practice is "a process in which students transform procedural knowledge from declarative form of rules to procedural form that can be expressed in practical operation through variant exercises of various rules". In the situational practice, the graduate students restore the abstract theory to the practical situation through role playing and "actual combat", through practical practice

experience and perception of practice. In this way, the "knowledge of technology" is transformed into "practical knowledge". The graduate students start from "know how to do" to "can do", and the rules in their practice consciousness and discourse consciousness are transformed into specific actions and presented the socialization of procedural knowledge.

D. Practice Experience and Realize Ability Transfer

Practice experience and situation are often linked together. The process of situational practice in case teaching is also the practical experience process of graduate students' initial experience of social practice. Through situational application practice, graduate students can generate the ability of knowledge contextual application. When they encounter similar social practice problems again, they can effectively mobilize the application conditions of case scenarios and situational adaptation exercises, automatically present the connection system between relevant theories, scenarios and practical behavior results, and make appropriate analysis and judgment, solve practical problems and improve practice Ability. However, although the procedural knowledge acquired by graduate students in case teaching situational practice can form a certain explicit behavior, it has not yet reached the degree of automation. Therefore, it is necessary to further extend the space for the transformation of declarative knowledge and procedural knowledge through other practical teaching places such as on campus training and off campus base practice, so that the acquisition of procedural knowledge of graduate students can gradually reach the level of automation section.

In the actual teaching process, we should master and make good use of heuristic interactive method. First of all, a series of closely related questions must be skillfully designed. These questions are not only familiar to the students but also can be answered through thinking. The results of the previous question constitute the beginning of the next question, closely linked with each other, and finally get the desired results through layer by layer.

Secondly, heuristic teaching focuses on interaction, without the active cooperation of students, it will not be effective. The interest of the question itself cannot stimulate the students' positive thinking. It also needs teachers to encourage, praise and stimulate students in time according to the students' psychology, and even establish an incentive system related to answering questions and evaluation, so as to form a positive and interactive good classroom atmosphere.

At the same time, teachers are the promoters of students' effective learning, the discoverer and cultivator of students' potential. After mobilizing the enthusiasm of students in class, we should further maintain students' learning motivation. We can often arrange exploratory questions to guide students to consult relevant materials and research related problems, so as to inspire education and students' exploratory learning. A question often has multiple answers, which is easy to form the dispersion of thinking. However, the class time is very limited, so we

must focus on the key problems to achieve the teaching purpose.

V. CONCLUSION

Case based interactive class teaching is not only a simple teaching method and teaching skill, but also a wide range of changes of knowledge and teaching perception. In order to overcome the difficulties and stimulate the vitality of case teaching, we must innovate the teaching culture, comprehensively grasp the relationship between scientific research and teaching, and establish the modern learning concept of autonomy, cooperation and inquiry.

A. Reconstruct the Relationship between Teaching and Scientific Research

The process of case-based interactive class teaching is a process in which teaching and scientific research complement each other and co-exist. On one hand, teachers incorporate the frontier scientific research results into cases, and infiltrate the scientific spirit of advocating truth and critical inquiry into case teaching, which can enrich the teaching content and stimulate the vitality of teaching; on the other hand, students focus on the use and creation of knowledge, breaking through the traditional connotation of "spreading knowledge"; students' awareness of inquiry and reflection, discussing and analyzing cases will stimulate the spirit of inquiry and creativity New capabilities to promote the quality of scientific research.

B. Define the Value Orientation

The value orientation of case-based interactive class teaching is not simply to highlight a certain aspect of the value of people, knowledge or society, but to integrate "human value, social value and knowledge value" into an integrate body and achieve interactive balance. In the pursuit of human value, case teaching should be "student-centered", attach importance to the significance of human life value, and attach importance to the growth and development of personality, criticism and practice. In the cultivation of social responsibility, we should pay attention to the cultivation of students' social responsibility consciousness and ability, and focus on cultivating talents with social applicability and adaptability. In terms of knowledge value, it is no longer only pursuing the transmission of known knowledge, but also highlighting the practicability and applicability of knowledge.

C. Reconstruct Modern Learning Concept

Graduate students are young people who are independent, free and have spiritual pursuit. They are the learning subjects of interactive class teaching based on cases. We must break through the barriers of "exam-oriented learning" and build a modern learning concept of autonomy, cooperation and inquiry. Teachers should mobilize the initiative of graduate students, make students change from passive learners to active learners, establish cooperative learning concept; teachers should guide graduate students to deeply participate in case study,

cultivate their own research consciousness, exploration spirit and innovation ability, and establish inquiry learning concept.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Yi Yang conducted the research of case based interactive class teaching mode for graduate students; Yi Yang and Dekuang Yu carried out the teaching practice, analyzed the feedback of teaching reform, and wrote the paper; both authors had approved the final version.

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Yi Yang was born in Guangdong Province, China in April, 1973. She got bachelor's degree and master's degrees in computer software in National University of Defense Technology, Changsha, China in the year 1994 and 1997 respectively, and got doctor's degree in pathology in Southern Medical University, Guangzhou, China, in the year 2005.

Since March 1997, she has been engaged in teaching and scientific research at the School of Biomedical Engineering of Southern Medical

University. In 2005, she was appointed as associate professor. In recent years, she has published more than 20 scientific research articles in journals, publications and academic conferences on computer software, and has written 8 books of programming and software development, including JSP Web Application Design Case Tutorial (Beijing, China: Posts & Telecom Press, 2014), Android Mobile Application Development (Beijing, China: Posts & Telecom Press, 2017), and Data Structure (C++ version) (Beijing, China: Metallurgical Industry Press, 2009). In the past three years, she has finished two provincial funds of science and technology research projects and participated in and completed a number of national and provincial funds for scientific research projects. She has been engaged in medical image recognition and detection, quantitative pathology, mobile application development, information system development, intelligent information processing. Dr. Yang is Director of Guangdong Biophysical Society, Member of Chinese Biophysical Society, and Director of Chinese Society for Stereology. She has won 12 excellent first prizes for teaching, 2 first prizes for teaching competitions at university, and 2 National Second Prizes for guiding JAVA competitions.



Dekuang Yu was born in Jiangxi Province, China in April, 1972. He got bachelor's degree and master's degrees in biomedical engineering in The First Military Medical University, Guangzhou, China in the year 1993 and 1999 respectively, and got doctor's degree in biomedical engineering in Southern Medical University, Guangzhou, China, in the year 2006.

Since March 1993, he has been engaged in teaching and scientific research at the School of Biomedical Engineering of Southern Medical University. In 2013, he was appointed as associate professor. In recent years, he has published more than 10 scientific research articles in journals, publications and academic conferences on biomedical engineering. He has finished one provincial fund of science and technology research projects and participated in and completed a number of national and provincial funds for scientific research projects. He has declared 3 national invention patents, and 2 software copyrights have been obtained. He has been engaged in medical image recognition and detection, electrocardiogram simulation, information system development.

Dr. Yu is Member of Chinese ECG Society. He has won 3 excellent prizes for guiding students to obtain 3 national and provincial science and technology competitions.