

Method Study on Improving Teaching Efficiency of Compulsory Courses

--Taking *Laser Principle and Application* as an Example

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Abstract

At present, students major in photo electricity information science and engineering, measurement and control technology and instrumentation of colleges and universities are not interested in the compulsory courses which require higher theoretical basis. And teaching efficiency of such courses is bad. Aiming at the issue, we put forward some important measures on how to motivate students' interest and improve the teaching efficiency of compulsory courses of such majors with a combination of course: *Laser Principle and Application*. From the aspect of teachers, a teacher shall accumulate rich application examples in various fields and prepare lessons efficiently. It is a precondition for improving compulsory course teaching efficiency. It is also effective guarantee to carry out vivid classroom teaching with a combination of cutting-edge technological development. Besides, it is fundamental guarantee for a teacher to bring in diversification means in the big data era and adopt advanced teaching methods. From the aspect of students, rich learning interest and positive learning attitude are the fundamental power to improve compulsory course teaching efficiency. In addition, necessary engineering practice ability cultivation is the fundamental goal.

Keywords: professional compulsory course, teaching effect, diversification method, learning interest

1. The introduction

Specialized compulsory courses are an important part of undergraduate teaching in colleges and universities, and a key link to realize talents training in colleges and universities. The teaching effect of compulsory courses directly affects the success of vocational education. With the advancement of engineering education professional certification, only firmly grasp the engineering and technical personnel training objectives, clear professional course reform be established new concept, adhere to the efforts to improve the effect of classroom teaching, flexible use of big data information under the background of diversified methods, overall effective improve the comprehensive quality of college students, to implement the vocational education and quality education in the real sense.

2. From the Teacher's Point of View to Improve the Teaching Effect

2.1 The Prerequisite of Improving the Teaching of Compulsory Courses Is to Make Full Preparation and Accumulate Abundant Application Examples

In order to make sufficient lesson preparation, professional course teachers should strive to accumulate rich practical experience and apply examples extensively on the basis of mastering the teaching materials, which can be reflected in the following aspects.

(1) Delve into possible goals, from the students' professional characteristics and needs, arrange the teaching content reasonably and highlight the key points. In the course of lesson preparation, we should try our best to find appropriate metaphors or specific examples for each abstract concept and key content with high requirements for theoretical basis, so as to enhance students' intuitive feelings and enhance their understanding and memory of theories. For example, when describing light and matter in *Laser Principle and Application*, students have difficulty understanding the interaction of matter in the micro world and wave optics. If the teacher in the process of teaching, the introduction of macroscopic visible things caused by the phenomenon of water and interaction analogy, immediately make students emerge a visual picture, improve the interest in learning.

(2) According to the characteristics of professional compulsory course knowledge and emphasis between theory and application, Determine the means of highlighting teaching key points and breaking through teaching difficulties. For example, the "working principle of laser" chapter in *Laser Principle and Application*. Students to spontaneous radiation, stimulated radiation, stimulated absorption of these teaching content is difficult to imagine, but they are not the focus of laser application, teachers can simulate these processes through flash animation, so as to help students understand these basic concepts.

(3) Make clear the students' cognitive rules, fully understand the students' existing professional basic knowledge, and select the "entry point" of classroom teaching. *Laser Principle and Application* in the teaching process of a lot of basic knowledge from physical optics, teachers can through the physical optics related content to bring students' ideas into the classroom of laser principle.

2.2 Effective Teaching Is a Strong Guarantee to Improve the Teaching of Professional Compulsory Courses

Classroom structure refers to the sequence and time distribution of each teaching link that constitutes classroom teaching. If teachers can reasonably allocate each teaching link according to the nature of the course, the teaching effect of professional compulsory courses can be guaranteed more effectively.

(1) Strengthen the important teaching link, simplify the model teaching link

Traditional classroom teaching requires the introduction of new lessons and new knowledge teaching consolidation exercises and other necessary links, but in the professional compulsory course classroom teaching some links are indispensable, such as the new knowledge teaching consolidation exercises, some teaching links are dispensable model process. For example, in the chapter "Typical Laser" in *Laser Principle and Application*, the new knowledge is not closely related to the old knowledge, even some teaching content will not involve the previous chapters, so teachers can resolutely omit the review of old knowledge, and increase the time to the point of higher interest of students. For another example, the working principle of laser and the optical resonator are closely related to the teaching content, and some new knowledge is naturally introduced in the process of reviewing the old knowledge, if the teacher must retain the introduction of new lessons in the teaching process This link, it will appear very stiff, not only will disrupt the continuous thinking of students, but also distract students' attention, and even weaken students' interest in learning; No matter how tight the class is, students will reject the teacher to occupy the break. Therefore, if the task is heavy in the class, students have well understood and mastered the knowledge to learn in the class, and the bell has rung, the teacher can also decisively omit the whole lesson summary.

(2) Pay attention to the development frontier of related technology field, interspersed with experimental training in each link

In the past classroom teaching, experimental training is generally treated in a centralized way, and the teacher explains theoretical knowledge in the first half of teaching, in the second half, students practice operations collectively. The disadvantages of this arrangement are obvious: students do not grasp the new knowledge in time because of the lack of experimental training, which directly affects students' learning of subsequent knowledge. In practice, teachers can introduce the development status of relevant technical fields to students more easily, and actively build up the desire for follow-up knowledge when students understand and consolidate new knowledge, thus bringing teaching effects beyond theoretical teaching. Therefore, the experimental training should avoid the centralized mode as far as possible and be interspersed in the process of classroom teaching

reasonably. For *Laser Principle and Application*, if the teacher blindly cramming in class to describe the composition and working Principle of each typical system, it is easy to cause confusion among students, resulting in fuzzy memory, and the results can not be corresponding after learning for a long time. We can take students to participate in the training according to the existing experimental conditions and relying on the scientific research team in the school, so that students can observe through their eyes to understand the functions and technical indicators of each system by hands-on operation, form real-time feedback of students' mastery of professional knowledge, help teachers timely find students' weaknesses in classroom learning, take remedial measures, and effectively improve the teaching effect of professional required courses.

2.3 The Practice of Advanced Teaching Methods Under the Background of Big Data Is the Fundamental Guarantee to Improve the Teaching of Professional Compulsory Courses

At present, the cultivation of undergraduates in colleges and universities emphasizes quality education and vocational education, which is different from exam-oriented education. Since it is different from exam-oriented education, it is not feasible to completely copy the strict education method of exam-oriented education. However, the education method of quality education and vocational education emphasizes the characteristics of the curriculum. In order to fundamentally ensure the smooth progress of quality education and vocational education, it is necessary to improve the teaching quality of professional compulsory courses. Teachers should be good at making use of the favorable conditions brought by the information age and adopt diversified teaching methods.

2.3.1 Case Based Study

The guidance education in the information age is to “trigger thinking” in the teaching of professional compulsory courses. The role of teachers is not only reflected in how much knowledge they impart to students, but also in guiding students how to learn knowledge independently. It is better to “teach people to fish” than “teach people to fish”. Teachers should change teaching to induce students to think, and students should change learning to think, that is, teachers should take the initiative to create a harmonious environment in the teaching process, so as to realize the subject status of students and take the initiative to explore knowledge. Teachers can push some teaching-related scientific articles through QQ and Wechat before class, so that students can walk into class with questions and find answers in class.

2.3.2 Innovation Teaching

The so-called innovation is not limited to existing knowledge, science and technology theory or system and other aspects of the fixed frame. We implement innovative teaching in the teaching of professional compulsory courses, which is to inform students that they should first learn prescribed courses well and master professional knowledge, because this is the accumulation of direct experience of ancestors or others, which is the truth. However, we should not be limited to all these, because professional knowledge is constantly updated with the situation. In the teaching of professional compulsory courses, we should interact with students through Internet resources. For example, if we share the excellent public courses with students, students can do full self-study after class and leave the classroom time for them to discuss and exchange. Or let the students submit their homework to the QQ group and WeChat group, the electronic homework is displayed in class, and the students reflect on their own results of listening to other students' homework.

2.3.3 Discovery Teaching

Discovery teaching requires teachers to pay attention to every student, to find their shining points. In fact, every student has a shining point, as long as you carefully excavate, we will be able to find, and once captured, we should immediately light it, make it brilliant. And if we do that, we're half the battle in teaching professional compulsory courses because in fact, in teaching professional compulsory courses, we should follow the principle of individualized teaching. The premise is that we position and plan each of the different “materials”.

3. Methods to Improve the Teaching Effect From the Perspective of Students

3.1 Attitude Determines the Result, and Keeping Interest Is the Fundamental Driving Force to Improve the Teaching of Professional Compulsory Courses

As the saying goes: “interest is the best teacher”, “Those who know are better than those who are good; He who is good is better than he who is happy”, After undergraduate students enter the university, they have to learn nearly ten professional compulsory courses, with many courses and extensive contents. In addition, the courses are boring and difficult to learn, so it is difficult for students to adapt to it all of a sudden. Therefore, as a teacher of professional compulsory courses, an important job is to pay attention to cultivating students' interest in learning.

(1) Make students clear about the purpose of learning the importance of the course ,with a clear purpose, students will not be afraid of learning difficulties, have the motivation to learn. For example, in the introduction class of *Laser Principle and Application*, you can first ask: what fields can *Laser Principle and Application* be applied to? Students will give a variety of answers, and then they can play a military decryption video and ask what the laser is used for. What would modern military development be without lasers? Why are lasers indispensable in the military? When the students heard these exciting topics, they suddenly became interested. On “laser applications” this class hour, by playing a series of video and show a lot of pictures, in the face of such laser is closely related to daily life in use, the classmates will ask how the laser application in every field, which can be in the later teaching starting from the principle, interpretation of the production of laser, and then introduces the key technology, and the application scope and method of use, and even some classmate of laser The optical system in the device is also very interested in the establishment of the future professional direction, professional compulsory course learning is not a chore.

(2) “Sow an attitude, reap a result.” For students, the learning of professional compulsory courses is also the same whether they can learn professional compulsory courses with active and diligent attitude and persistent interest will affect the learning effect of each student. Teachers should often use clever and flexible teaching methods to keep students interested. It is difficult to maintain a person's interest for a long time. Teachers can set opportunities for students to compare others' learning, catch up with others' learning and help others' learning, so as to maintain a positive atmosphere in which students are interested in classroom teaching. Such as talking about: “Nd:YAG solid state laser installation and Q Tuning technology experiment course”, the teaching content can be turned into a small competition for students, encourage all students to participate in the installation, observation of the phenomenon, the students are unwilling to lag behind, all want to occupy the experimental platform, in a relaxed and slightly nervous atmosphere, soon completed the teaching task, and the students harvest on the knowledge of the teaching material. In addition, we can also use different teaching methods, such as discussion, visit and video viewing, to keep students' interest in learning with vivid and changeable teaching methods.

3.2 What's Learned From Books Is Superficial After All, the Cultivation of Ability Is the Fundamental Purpose of Improving the Teaching of Professional Compulsory Courses

(1) Charles Darwin, a famous biologist, said: the most valuable knowledge is the knowledge of methods. Darwin's view has long been universally accepted. Relevant statistical results can fully prove this point, a college graduate, he received in the undergraduate stage of professional knowledge almost only accounts for one tenth of the knowledge needed in the future, the rest have to continue to learn precipitation in the work, let alone outdated methods are constantly replaced by new technology. Therefore, as a teacher, it is important to train students' systematic engineering practice ability in the teaching objectives of compulsory courses. For example, in the teaching of *Laser Principle and Application*, students can be guided to do experiments of acoustoptic modulation technology and electro-optic modulation technology in addition to theoretical study. Can also be combined with the course content, teaching students refer to other professional teaching materials Using a variety of professional reference books, such as photoelectric information science and engineering students of measure and control technology and instrument have ‘*Optical Component Design Manual*’ ‘*Mechanical Design Manual*’ Can guide the design of concept, to understand the academic papers can through the online platform for data retrieval, etc. So when students encounter difficulties in practice, consult what materials, read what manuals, with the help of what means of the solution will automatically jump out.

(2) Professional quality and professional ability are equally important. Each major has many related courses, which will lay a foundation for the study of the required courses and the future work. Therefore, in teaching, students should not only look at "professional knowledge points", but also pay attention to "professional knowledge" and professional skills. Pay attention to professional skills. For example, students in the direction of optical processing are not only to do cold processing of optical parts and optical coating, but also to master the basic knowledge of optical design and other aspects, and to cultivate the ability of optical design if possible. With a certain professional quality, no matter which department in the relevant major after graduation, engaged in what kind of work, can quickly adapt to the needs of the job, can further study deep study and do a good job.

4. Conclusion

In a word, it is not easy to teach the required courses well for undergraduates in colleges and universities. It is not only affected by the factors such as the quality of teaching materials, the quality of students, the ability of teachers, but also restricted by the teaching conditions, scientific research background, social environment and other facts, However, my experience is that the era of big data provides teachers and students with rich network

technology means, and constantly expands the information sharing and communication between teachers and students. As long as teachers make efforts in the five aspects mentioned above, they will be able to fulfill the teaching purpose of professional compulsory courses and improve the teaching effect of professional compulsory courses.

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