



Probe into the Teaching Reform Thinking of "University Physics" in Local Universities

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Abstract: For students from local undergraduate universities with generally poor foundation of mathematics and physics, there are indeed many problems in the current course teaching of "University Physics". How to reform the college physics course teaching of this kind of local colleges and universities, which account for more than 70% of the national colleges and universities, so as to truly meet the requirements of talent training goal, course teaching goal and achievement degree under the concept of OBE, and lay a solid physics foundation in their professional learning and development is an important topic worth exploring together. Here, some superficial personal views are presented.

Key words: teaching reform "University Physics"; OBE concept; objective achievement scale

1. Main Problems

"University Physics" is a public basic course that almost all science and engineering majors need to learn, and it is often called a "general education course" in universities abroad. The higher the level of research universities, the more they attach importance to the teaching of college physics courses. Because no matter from which aspect, "University Physics" is an important basic course that cannot be separated from almost all professional learning and professional development. The contents of force, heat, sound, light, electricity, magnetism, quantum, and relativity covered by college physics, whether it is classical physics or modern physics, have increasingly shown that they cannot be included in the fast-developing world's cutting-edge science and technology. Erasing them, and becoming a starting point for many new technologies and new theories. Among the dozens of companies I have contacted, the so-called problems that many engineers and technicians have been unable to solve for many years are mostly physical problems in the final analysis. Therefore, "University Physics" is self-evident for both talent training and technological innovation.

Every time the author participates in a national university physics teaching reform and research seminar, there is almost always a sympathy or consensus. That is, there are many problems in the teaching of "University Physics", which seem to be unsolvable, especially for local science and engineering colleges and universities. In summary, there are roughly the following problems.

1.1 Cognitive bias

At present, there are some incorrect understandings. It is believed that the general local science and engineering colleges do not emphasize the importance of the physical foundation, or even consider it dispensable. That is to say, schools, colleges, or professional teaching and research offices do not pay enough attention. Therefore, in the process of

compiling student training programs and syllabuses, one is to subjectively reduce the number of college physics course hours. There are even universities where many majors only arrange 48 hours per semester. Physics courses, or some majors directly cancel college physics courses, far from reaching the standards set by the Physics Teaching Steering Committee.

1.2 Poor mathematical foundation

Compared with double first-class colleges or provincial key colleges and universities, students recruited by local colleges and universities generally have insufficient solid foundations in mathematics and physics. There are also regional differences. For example, the average score in physics for the college entrance examination in Guangdong will be more than 40 points lower than the average score in physics for the college entrance examination in Jiangsu province. In other words, without a little foundation in mathematics and physics, many students may not understand the teacher's explanation in class.

1.3 Lack of matching teaching mode

The college physics teaching requirements of local colleges and universities completely copy the teaching mode of the original national key universities. Therefore, there are some unsuitable problems in the teaching materials used, the content arrangements and requirements of teaching, the teaching methods of students, and the assessment methods. College physics teaching in this type of school is practical.

1.4 Poor learning consciousness

Students in local colleges and universities generally have problems with their learning goals, self-consciousness and learning methods. For example, they do not take the initiative to study independently after class. Very few students can take the initiative to participate in evening self-study. Many students throw books after the class. Don't ask if you understand, it's common for homework to be plagiarized.

1.5 Insufficient teaching methods and understanding

For such schools and students of this level, how can teach this course well, so that students can really learn the basic principles and basic knowledge points of basic physics, the understanding, research and reform of which are not enough, and so on.

1.6 Lack of supervision mechanism

Foreign higher education actually has a high elimination rate. In other words, it is the student's own business whether to learn or not. It is the student's personal behavior that you are willing to take the money to retake until you pass it. University fresh graduates can get a degree. It may be less than 50%, or even less than 40%, and there will be no problem of low graduation rate. In domestic colleges and universities, advanced mathematics and college physics have become the courses with the lowest passing rate of students, which seems to have caused some "negative" effects on students' professional development. It often happens from time to time that this responsibility is attributed to the illusion that college physics or advanced mathematics teachers did not teach well.

1.7 Lack of top-level design

In the new era, the basic physics courses of these local colleges, which are generally poor in mathematics and science, accounting for more than 70% of the national colleges and universities, should be taught, how should their teaching goals be set, and how can they achieve better teaching effects or degree of achievement. There is a lack of top-level design. There are not many experts who can pay attention to this issue.

2. Reform Thinking and Ideas

For local colleges and universities that account for more than 70% of all colleges and universities, the existence of the above problems is common. Reforms based on traditional teaching thinking are not easy to carry out and implement, and

the assessment method based solely on the passing rate of the exam is also incorrect. The reason is that it has not been able to carry out targeted and effective reforms based on the essence of the problem. How to carry out effective teaching reform of "College Physics" for local colleges and universities is worthy of in-depth research. The author believes that we can sort out the ideas for the teaching reform of physics courses in local colleges and universities from the following aspects.

2.1 Reform of teaching materials

Textbooks are guide books, that students can read and understand. University is different from high school, it requires students to implement conscious self-learning after class based on the teacher's limited time in class. Students can understand the true meaning of the content of physics knowledge through the textbook, especially the physical meaning, and be able to independently deduce the basic expressions of the laws of physics. Therefore, it is the most basic requirement of teaching materials in the new era to be able to make students understand, and it is mainly aimed at the problem of poor physical foundation that students generally exist. Secondly, students can understand the meaning of physics, and can start from the conceptual principles to give a summary of mathematical expressions and experimental rules describing the principles of physics, so as to achieve the basic goals of the course teaching of "College Physics".

2.2 The reform of teaching content is imperative

Have the courage to make choices, and be able to teach and learn to make students have the most basic understanding of the most basic physics knowledge, instead of those being required by the goals of a double first-class university, because the training target is not "high-tech" students, but a large number of first-line engineers or technical practitioners with basic abilities and qualities. Secondly, the content of teaching should be able to be closely integrated with the practical application of physical principles, and be able to use these basic principles to judge and deal with some practical engineering technical problems.

2.3 Close integration of class and after class

Classroom teaching must be closely integrated with after-class learning, so that students can actively follow the teacher's guidance to study and practice after class. Classroom teaching should be organically linked to the actual situation of the students' learning process, in other words that as a teacher, we must understand the learning situation of students.

2.4 Higher demands on teachers

This is because it is true that the basic principles of college physics can be explained from a higher perspective, and they can be wonderful, attract students, and make students understand, can be integrated, and can combine the latest applications of physics principles. What the teachers can do is to improve their own academic, scientific research and teaching abilities. This is why the master can put forward a more complex and advanced problem and can make everyone understand and speak the truth.

2.5 Guiding and conducting students

In the past, the teaching task was completed even if a few exercises were arranged after the lecture. This way of thinking needs to be corrected, because the majority of teachers today are facing a large group of "special" in the new era. Many students are a group that don't know how to ask questions, how to study by themselves, or even how to review. Most of them did not really establish good study habits and learning methods during middle school. It is necessary to strengthen the guidance for students' learning. First of all, let students be willing to accept it. Secondly, students can keep up with the teacher's ideas and basic requirements in time. The third is to pay attention to the students' learning status and actual results in time. If you feel that the students do not understand, then try to speak more slowly and more clearly.

2.6 Reform of the assessment and evaluation mechanism

In-depth reforms are needed in the assessment and evaluation methods of student learning. This is closely related to

the teaching objectives of the "University Physics" course and the degree of achievement of students' learning. The OBE concept should be implemented in the entire teaching process and must be truly implemented.

3. Specific Methods and Judging Mechanism

According to the above analysis and judgment, in colleges and universities that have a poor foundation in mathematics and physics accounting for more than 70% of the country, the reform of the course teaching of "College Physics" can have the following specific methods.

(1) The syllabus of "University Physics" under the trend of popularization of higher education in the new era needs to be designed and revised in a targeted manner. On the one hand, its goal is to ensure that a certain physics foundation is supported during the training of professional talents. At the same time, it is necessary to ensure that the college physics knowledge learned can really complement the professional development of the student, and it can have a certain degree of professional development after graduation.

(2) The content of the college physics curriculum should be revised. First of all, we must emphasize the importance of physical concepts in college physics, emphasize the physical ideas and original starting points of some physical laws and experimental laws, as well as the important significance and application value of these laws. Therefore, it is very urgent and necessary to organize the compilation of "University Physics" textbooks suitable for local colleges and universities. At the same time, the actual application content of physics, physics and engineering must be closely integrated.

(3) The teacher of the "University Physics" course must be able to stand on a higher level to complete the teaching tasks of the course through the principle of "teaching according to the individual". At the same time, the teacher needs to have a high degree of scientific and technological sensitivity. Pay attention to the organic connection between the basic knowledge of university physics and the latest scientific and technological progress. This is precisely the best teaching case in the course of teaching, which will greatly enhance the attractiveness of the course.

(4) The examination and evaluation of courses and the evaluation of teaching effects should be deeply reformed. The main purpose is to ensure the achievement of the design for this type of students, not the same as the achievement of the "University Physics" course teaching in double first-class universities. Obviously this is not easy to do. Therefore, "teach students in accordance with their aptitude" should be implemented in the whole process of talent training goals, course teaching goals and course teaching process, instead of sitting in the office "thinking out of thin air" to design, and at the same time, it requires a large number of front-line teachers to conduct serious discussions and update philosophy, form a consensus, and find a better implementation method.

4. Conclusion

The curriculum teaching reform of "University Physics" in local colleges and universities has reached a critical moment that requires serious thinking and active reform. This is the urgency and necessity of the implementation for China's higher education and national talent strategy. It is also an urgent need for the starting point and end point of carrying out targeted teaching reforms. Based on many years of teaching experience of "College Physics" in different types of universities, I propose some superficial understandings and ideas. The main purpose is to carry out active exchanges and discussions with colleagues to jointly promote the continuous reform of "College Physics" course teaching and make new progress.

Acknowledgments

This article was supported by the following fund projects: Materials Science and Engineering Provincial Featured Professional Project (GDJX2019006); Guangdong University Physics Teaching Team Project (GDJX2018003).

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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