

## Analysis of the Relevance between Educational Ideas and Teaching Work

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**Abstract:** There are some restrictive factors in the development of teaching work in universities. Teachers need to understand some educational ideas and guide the improvement of teaching work. Aiming at the basic thought and characteristics contained in different educational ideas, this paper discusses the leading role of educational ideas in teaching work. Different educational strategies and teaching methods are explored from different levels to improve the teaching work and gradually improve the quality of talent cultivation.

### Introduction

Improving the quality of education is the eternal theme of talent training in universities. Teaching as the center is also the guiding ideology work of universities. However, in the concrete implementation, the evaluation of universities performed by various institutions is mainly based on scientific research results, the central position of teaching in universities have not been achieved in the process of education. At the same time, the evaluation and assessment of teachers in most universities are mainly based on the indicators of scientific research performance, which is not closely related to the teaching quality of teachers. This makes it become difficult for teachers to truly focus on teaching work.

In particular, most of the young teachers in universities have PhD degrees. Although they have strong scientific research ability, they lack teaching experience and the guidance of educational theories. They are not well competent for teaching work. This has become a restricting factor for the development of teaching work in universities. Therefore, in order to ensure the central position of teaching and improve the quality of education in universities, we need to pay attention to it ideologically, and also need the guidance of educational ideas.

There are many kinds of talent training models in universities, and the educational ideas are not consistent. At present, the more advanced educational ideas are CDIO education idea [1-2], OBE engineering education idea [3-4] and constructivism theory [5-6], *etc.* Different educational ideas will provide different educational strategies. If different educational theories can be applied to teaching organically, it is of great significance to improve the teaching design, teaching methods and personnel training.

### Improvement Measures of Curriculum Teaching Based on CDIO Educational Concept

CDIO engineering education concept takes the life cycle of product from the research and development to the operation as the carrier. It constructs the entire process engineering education environment of the real product "Conceive, Design, Implement and Operate" for the student. According to the requirements of contemporary engineering education objectives, a detailed CDIO outline and standards are formulated according to the four levels of engineering basic knowledge, personal ability, teamwork ability and engineering system ability [7]. In order to achieve the training goal of the syllabus, it is needed to pay attention to the teaching effect of each course that the students study. Only by doing well the teaching work of each course, the multi-level training goal of CDIO can be achieved.

For example, "Engineering mechanics" is a basic course for some engineering students. There

are many teaching methods including heuristic, interactive and inquiry for teachers. Teachers can usually ensure better teaching quality by using blackboard writing, teaching aids, multimedia and other teaching techniques. However, there is little change for the learning mode of students. Usually students still study according to the steps of listening to lectures, reading books and doing homework. The homework questions are almost idealized simulation questions. The designed homework is mainly used to train students' ability to solve problems by applying theoretical knowledge. Therefore, the homework questions usually give the calculation model directly, rarely involve the training of students to establish the calculation model independently. The relevant parameters needed in the calculation process are also given, and students are not required to determine. There are standard answers to homework, and students do not need to analyze the rationality of the results.

In contrast to the CDIO syllabus of teaching competence, which has clear requirements for many aspects such as establishing patterns, evaluating data, analyzing assumptions and deviation sources, analysis with uncertainty, listing references and so on. Obviously, the aforementioned learning style is not conducive to the training of multidimensional competence.

Therefore, based on the concept of CDIO, teaching improvement is carried out from the perspective of changing students' learning mode, and some practical questions are added on the basis of retaining routine assignments. The practical questions are not simulation questions, but based on practical problems, which require students to build calculation model, to test the size of components and to check the constant of materials by themselves. They need to apply theoretical methods to solve problems. For the analysis of the real problems, it has a real perceptual understanding, and students' interest in learning increased significantly. It is important that all the questions have no standard answers, and students should analyze and judge the reasonableness of each step in the process of solving the problem.

In addition, after the students finish these kinds of questions, the teacher should extend the problem to other problems in order to increase the expansion of knowledge. For example, a sheet of paper folding placement, its strength is higher than horizontal placement, stability is better than vertical placement, the principle of making corrugated plate in engineering is similar to the continuous folding of a sheet of paper. Another example is the pencil compression. The whole is the inner core composite material. The related engineering components are reinforced concrete, concrete filled steel tube, and so on.

Practical topics cannot go through the whole process of CDIO for a product, but they can provide students with the opportunity to go through the whole process of solving problems. They can involve many levels of ability development. From a complete process of solving problems, students have increased their perceptual knowledge, deepened their understanding of the theoretical knowledge of the course, obtained the improvement of many abilities such as establishing models, putting forward assumptions, data evaluation, theoretical application, result analysis and teamwork, and changed the limitations of learning style and rigid thinking mode.

The teaching mode constructed under the guidance of CDIO education philosophy is mainly to change students' learning mode. CDIO's educational concept and detailed syllabus can guide teachers to design the teaching process. Teachers can explore specific, feasible and sustainable teaching methods, and create opportunities and approaches to increase students' ability, so as to achieve the goal of cultivating students' multi-level ability.

## **Teaching Strategy of Design Work Based on Constructivism Theory**

In the modern educational theory system, learning theory plays an important role. It is the psychological theory to explore the essence of human learning and the formation mechanism of knowledge and skills. It has developed from behaviorism learning theory and cognitivism learning theory to constructivism learning theory.

Constructivist theory holds that the acquisition of knowledge is the result of the interaction between learners and the external environment. People's understanding of things is related to their

own experience, and they see learning as creating meaning based on experience. That is, learning is regarded as a psychological activity, but it emphasizes that both learners and environment are important.

By engaging learners in a real-task situation, it is possible to use acquired knowledge in new situations to learn new knowledge relevant to the situation. Accordingly, for students majoring in engineering, if the teaching goal is to have the ability to design houses or mechanical equipment, the teaching content should not only let students understand the basic knowledge and specific rules of design work, but give them a real design task. In the process of completing the design task, students use relevant knowledge to design like the real designers, so that students in the learning process really become the subject of information processing and the active constructors of knowledge meaning. They are not the passive recipients of external stimulation.

Constructivist teaching is especially suitable for learning tasks that require a high level of cognitive processing. If the students are assigned some real design tasks with real design environment, the students will have a more comprehensive understanding of the main links of the design by going through a complete and real design process. Driven by the guidance of teachers and the real design environment, students can teach themselves a lot of new knowledge and construct a unique personal cognitive system. The comprehensive ability will also be significantly improved for students.

### **Teaching Strategy based on OBE concept**

As an advanced educational concept, Outcome Based Education has formed a relatively complete theoretical system and implementation model. According to the concept of OBE, it is necessary to clarify the students' learning results. That is the ability and graduation requirements that students can achieve after learning. We should pay attention to the design of curriculum system and clarify the contribution of each course to the ability index and graduation requirements. Teachers should explore better teaching strategies and methods according to the specific requirements of the curriculum system.

For example, the course "engineering mechanics" is a theoretical and systematic basic course. From the study of the course, students ought to achieve three objectives as following. (1) They have a clear understanding of the component carrying capacity, and have a clear basic concept and necessary basic knowledge about the balance, strength, stiffness and stability of the member. (2) Students shall have the basic ability to obtain various kinds of information by comprehensive application of various means. They can express and communicate engineering problems by means of words, graphics and software. By strengthening the engineering practice link, the students can have the initial mechanical modeling ability, certain qualitative analysis ability, self-study ability and logical thinking ability. Students should have the consciousness of autonomous learning and lifelong learning, and have the ability to learn and adapt to development continuously as well. (3) Students should possess humanistic quality, scientific spirit and social responsibility. They are also able to understand and comply with professional ethics in engineering practice.

Students should meet following the graduation requirements: be able to use mathematics, natural sciences, engineering fundamentals and expertise to solve complex engineering problems in related fields. Under the guidance of the OBE education philosophy, a teaching environment of "knowledge, ability and quality" should be created according to the ability and graduation requirements of this course in the professional training program. The teaching content is determined according to the training objectives and graduation requirements, and the teaching design is carried out according to whether it is beneficial for students to achieve the expected objectives.

Teachers will act as teaching organizers in classroom teaching, fully mobilize students' subjective initiative, pay attention to cultivating students' innovative consciousness and ability, and construct an interactive teaching situation between teachers and students. The teacher carries on the teaching evaluation according to the students' learning effect. Then they adjust the teaching content according to the teaching situation feedback, consummates the teaching design, gradually enables

the teaching process to meet the course objectives and the graduation requirements.

## Conclusion

In order to establish a student-centered teaching model and improve the quality of talent training, teachers should take the initiative to learn advanced educational ideas and teaching methods, and apply the theoretical knowledge learned to practice. By deeply understanding the connotation of different educational ideas, different teaching strategies are proposed for different teaching problems. It can also aim at the same kind of problems, integrate different educational ideas, and construct a teaching environment that can improve students' comprehensive ability.

Teachers should give full play to the guiding role of educational ideas and choose the teaching mode according to students' knowledge level and the characteristics of learning tasks; so that the teaching process can achieve the purpose of cultivating students' comprehensive ability and improving the quality of talent training.

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