The Exploration and Practice of Classroom Teaching Reform from the Perspective of Promoting Students' Professional Development

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Abstract. The main content of this paper is how to carry out curriculum teaching reform in the perspective of promoting students' development. By giving full play to the breakthrough role of the classroom, taking the academic evaluation of the whole process as the starting point, the course content is reconstructed from the perspective of majors and curriculum system, several optimized classroom teaching strategies are given, and the teaching design of the integration of learning evaluation is carried out. In order to encourage students to actively participate in the classroom, several efficient classroom teaching methods have been provided. In order to leverage the motivating role of evaluation in teaching, an integrated design of teaching evaluation was carried out, and specific integration ideas were provided. The method adopted in this article has universality from content reconstruction to teaching implementation, providing a reference paradigm for classroom teaching reform in other courses.

Keywords: Classroom teaching, 5-Star teaching principle, Content reconstruction, Teaching evaluation

1 Introduction

In May 2022, the Shandong Provincial Department of Education issued a notice to promote classroom teaching reform[1]. The notice emphasizes that classroom teaching should be used as a breakthrough point, and the entire process of academic evaluation should be used as a means to comprehensively promote the integrated reform of teaching concepts, teaching content, teaching models, teaching evaluation, teaching management, and the application of modern teaching technology, in order to cultivate high-quality talents with solid basic knowledge, innovative spirit, and the ability to undertake major tasks. According to the requirements of the notice, taking the course "Fundamentals of Mechanical Design" as an example, this article first reconstructs and organizes the course content from the perspective of professional talent cultivation, and then provides several classroom teaching strategiesand methods of teaching evaluation for reference in other courses.

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2 Curriculum Content Reconstruction from the Perspective of Professional Talent Training

2.1 The Logic of Professional Talent Cultivation and Curriculum Teaching Design

Each major has clear graduation requirements in its training plan, and each graduation requirement is supported by corresponding courses. On the other hand, each course corresponds to clear indicator points and strong or weak support, which means that each course has clear functions and tasks in the curriculum system. So, when reorganizing course content, it is important to consider professional requirements and establish knowledge links with other courses[2-3].

2.2 Professional-oriented content reconstruction

The course "Fundamentals of Mechanical Design" is offered for multiple majors. Based on the above discussion, it can be seen that its functions vary when teaching different majors. Taking the vehicle engineering major as an example, the chapters are no longer explained in sequence, and the course content is reorganized based on the main components of automobiles. It can be observed that the focus of the course content has changed. Chapter 11, which was not originally the focus, will be the focus of this major. As shown in **Figure 1**.

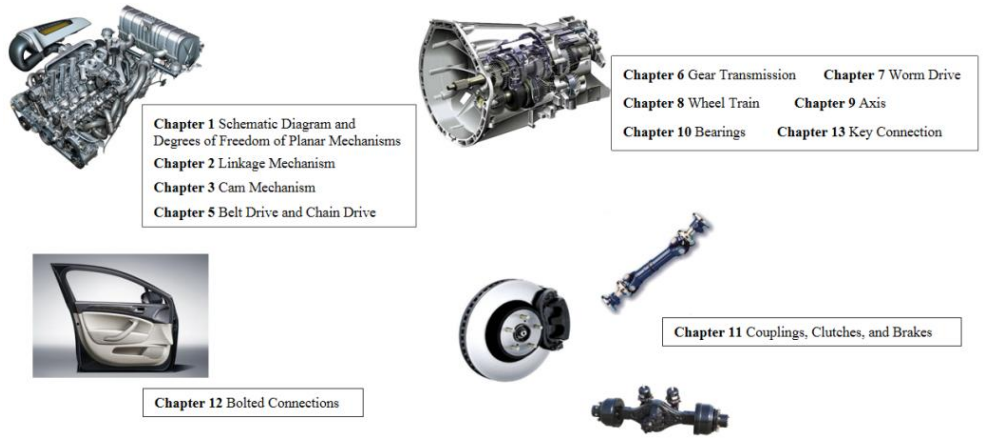

Fig. 1. Professional-oriented course content reconstruction ideas

2.3 Content Reconstruction for Curriculum System

When reconstructing the curriculum content, it is also necessary to leverage the combined efforts of the curriculum system. In the course, it is necessary to use as many prerequisite courses as possible to advance and connect knowledge points. At the same time, it is also necessary to improve the depth and difficulty of the course content, closely connect with the forefront of professional development, and carry out professional extension. By adopting this approach, we can break through the limitations of single textbooks and make the curriculum more three-dimensional and rich.

3 Content organization based on the 5-Star teaching principle

The 5-Star teaching principle was proposed by Professor Merrill of Utah State University in the United States, who summarized the advantages of various teaching strategies and divided the teaching process into five basic processes, and successfully integrated into various teaching modes and courses for use[4-6].

The core of the 5-Star teaching principle includes[7-9] : (1) Focusing on Problems: Teachers focus on problems or tasks to stimulate students' interest in learning.(2) Activate old knowledge: Emphasize the effective use of old experiences related to the new knowledge taught. (3) Demonstrating new knowledge: Teachers and students jointly demonstrate and learn new knowledge to achieve teaching objectives. (4) Attempt to apply: Students apply new knowledge they have learned through examples, digest new knowledge, and teachers provide guidance and feedback. (5) Integration: It is the ultimate state of learning, where students consciously apply new knowledge into their daily lives and can flexibly apply what they have learned to different situations, achieving self-improvement.

The content organization idea based on the 5-Star teaching principle in this article is shown in **Figure 2**.

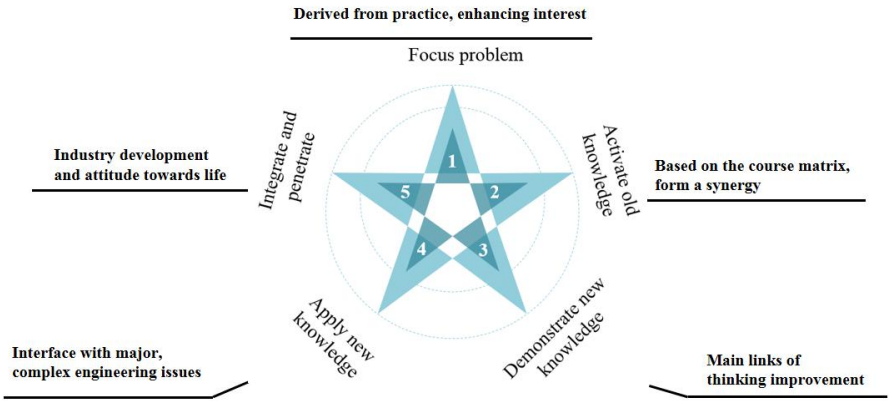

Fig. 2. Content Organization Architecture Based on the 5-Star teaching principle

Based on our school's positioning, choosing the 5-Star teaching principle for content organization here has three advantages. Firstly, this organizational approach is problem driven, which can originate from professional practice and enhance students' interest in learning; Secondly, it activates the matrix of old knowledge related courses and practices the curriculum system; Thirdly, the application of new knowledge and integration can be combined with majors to solve complex engineering problems, which is particularly in line with the needs of cultivating applied talents. Overall, it provides us with an organizational framework for why we learn, the process of learning, and how to remember and use the knowledge points. It is highly aligned with the ideas for reconstructing course content and is suitable for the needs of cultivating applied talents.

4 Classroom teaching practice

In order to train students' ability to learn independently and actively participate in the classroom, teachers' organizational methods are particularly important. Figure 3 provides many strategies for active learning from simple to complex[10]. If the classroom is compared to a stadium, in order to train students' initiatives, teachers should continuously pass the ball to students without hesitation, allowing them to continuously receive and pass the ball. Prior to this, teachers need to carefully plan and match appropriate teaching strategies based on content. As the course progresses, dynamic adjustments need to be made in a timely manner according to the situation to achieve the expected teaching effect. Here are several commonly used classroom strategies.

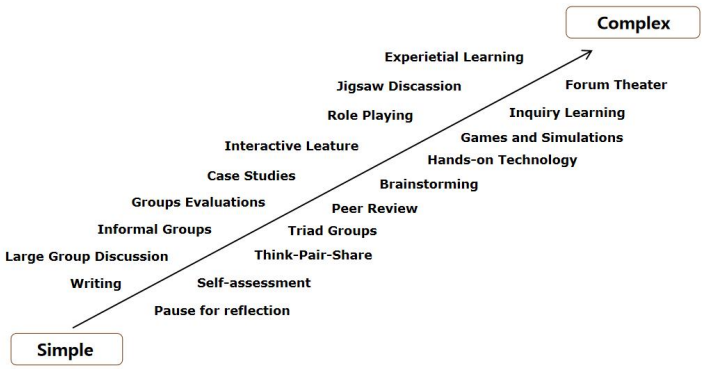

Fig. 3. Positive teaching strategies

4.1 Groups

Group collaboration is a common classroom teaching organization model that we often adopt, but it is also the most difficult one because students often "ride" and it is not easy to evaluate, so grouping is crucial. Compared to allowing students to group freely, teachers can achieve better results by grouping students according to their credit grade points. Such grouping has the characteristics of homogeneity between groups and heterogeneity within groups, and the levels and abilities between groups are more balanced.

In addition, projects that require group collaboration to complete are generally challenging, and structured problem guidance should be used instead of throwing the entire problem at students. Structured guidance will help students develop good habits of organized and logical thinking. In addition, in the process of group collaboration, it is necessary to clarify the division of labor among students, in order to improve the efficiency of group collaboration.

4.2 Classroom Notes and Mutual Evaluation

Taking notes is a method to enhance students' classroom attention, and at the end of each chapter, students are randomly asked to conduct mutual evaluations of their notes, pointing out areas worth learning and areas for improvement. While reviewing knowledge, they can learn from each other many learning methods, thus evaluation is learning, and learning is evaluating.

4.3 Teachers and students co-write questions and answers

Asking questions is a frequently used strategy in the classroom, but there are areas for improvement. During the questioning process, there are often situations where students are unable to answer, and asking students to sit down, changing classmates, or teachers to ask and answer themselves are not good solutions. The correct handling method should be to reduce the difficulty of the question and push it forward for students to answer. After answering, guide students to think backward, which is to establish a question and answer cycle between teachers and students. This approach not only guides the individual students being asked questions, but also allows the entire class to closely follow the teacher's questions and think, thus enabling students to effectively participate in the classroom. **Figure 4** shows a reasonable questioning mode.

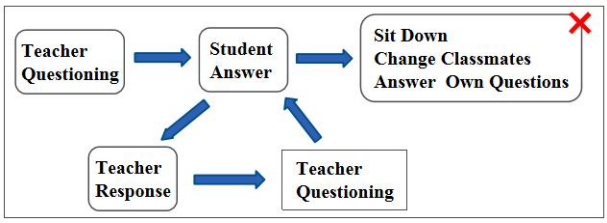

Fig. 4. Questioning mode

4.4 Peer learning

Figure 5 shows the peer learning model.When the number of students in class is large or the knowledge is difficult, peer learning and teaching can be adopted. Through face-to-face communication and collaboration, students can greatly improve their expression and understanding abilities. However, in order to avoid this method becoming mere formality, it is necessary to closely follow personal testing after mutual learning to consolidate the effectiveness of peer learning.

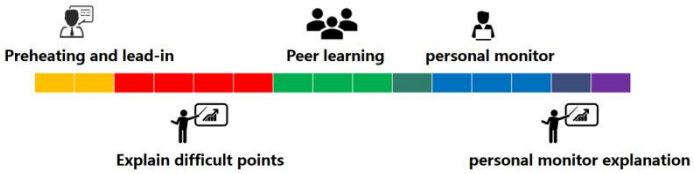

Fig. 5. Peer learning model

5 Teaching evaluation

5.1 Overall approach

In the new requirements of classroom teaching reform, emphasis is placed on academic evaluation throughout the entire process. In traditional academic evaluation, students were

scored to measure whether the course met the standards, mainly corresponding to assessment and certification. However, the purpose of evaluation is not to evaluate teaching, but to better evaluate students' learning, promote students' learning, and should have clear process attributes and motivational functions. Teaching evaluation should grasp students' learning level through real-time monitoring, identify the latest development areas of students' learning, and teachers should provide timely feedback to enable students to understand their learning situation and adjust their learning status calmly and dynamically.

There are currently three main evaluation modes used: (1)Formative Assessment.This evaluation method can ensure the achievement of learning objectives, promote students to regulate and improve their learning state, because

Detection feedback is the foundation of correction, so it is usually carried out through methods such as testing, interaction, discussion, and homework. (2)Diagnostic Assessment. This method mainly detects students' phased improvements or achievements, usually carried out at the beginning of the course or during the course, mainly through questionnaires, group practice, chapter testing, stage testing, and other means. (3)Summative Assessment. Using this method to benchmark the overall teaching objectives of the course and evaluate the learning objectives as a whole, usually using methods such as tests, papers, and reports.

In view of the above ideas, this paper adopts the evaluation approach of integrating learning and evaluation, and promotes students' learning through an integrated evaluation mechanism of teaching learning and evaluation.

5.2 Specific Evaluation Methods

Tables 1 presents the specific evaluation methods used in the course "Fundamentals of Mechanical Design".

Table 1. Correspondence between learning process and evaluation

Teaching Process	Main assessment points of teaching process	Assessment method	Assessment form
Focus problem	Exploration of the content (problem) to be learned	Preview exercises	Focus on objective questions
Activate old knowledge	Mastery of old knowledge	Discussion session	Participate in questioning
		Peer learning	Rain classroom discussion module, barrage
Demonstrate new knowledge	Mastering specific knowledge points	Test the questions in class	Multiple choice, fill in the blanks, short answer, calculation, etc
		Chapter testing	
		Group discussion in class	Subjective questions in class
		Classroom notes	Teacher evaluation, student evaluation
Apply new knowledge	Application	Individual work	Think and answer
		Team assignment	Project operation
Integrate and penetrate	Knowledge expansion and connection	Individual assignment	Mind mapping
		Team assignment	Project operation
	Innovation expansion and application analysis	Test paper	Answers, designs, reports

Figures. Because the 5-star teaching method is used in this article to organize teaching content, in order to organically integrate teaching and evaluation, the main assessment points, assessment methods, and assessment forms are provided for each link in teaching. In this way, the entire process of assessment can be achieved for each learning goal. In the final evaluation of students' grades, formative and diagnostic assessments accounted for 60%, while summative assessment accounted for 40%. By strengthening the process assessment, students were urged to focus on their daily work, playing the main role of the classroom.

6 Conclusions

This article focuses on students' professional development, revolves around classroom teaching reform, and aims to improve the quality of talent cultivation. It explores and practices the reconstruction and organization methods of course content, optimizes several classroom teaching organization models, and highlights the role of evaluation in the entire teaching through the design of integrated teaching evaluation. The method constructed in this article has been proven through several rounds of teaching practice by the author, and it has strong operability and can effectively improve teaching effectiveness. It has been promoted and used in the course group where it belongs, and can also provide reference for different courses.

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