Practice of Practical Training Course Reform Under the New Teaching Concept-Taking Metalworking Practice Course as Example

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Abstract. At present, there are many problems in the teaching process of Metalworking Practice, such as lack of in-depth ideological and political education, single training project, neglect of students' ability training and so on. Therefore, taking "Lide Shuren" as the fundamental task, combining with the current learning characteristics of students, updating training projects, innovating teaching design, optimizing teaching process, encouraging students to actively participate in the classroom, highlighting the new teaching concept of "student-centered development", cultivating students' basic abilities such as autonomous learning, innovative practice and teamwork, etc. Improve the teaching effect and the quality of personnel training, and provide a certain reference value for the reform of other related courses.

Keywords: Student Development; Yeaching Innovation; Ability Transformation; Curriculum Reform

1 Introduction

Outcome-based education (OBE) is a teaching concept that takes students' ability outcomes as the guide, and reversely designs the education and teaching objectives, teaching contents, teaching processes, and teaching evaluation standards that meet the needs of students' ability development, so as to obtain the expected learning outcomes of the course [1-2] .As a basic practical course, "Metalworking Practice" has a long-term solidified training mode, ignoring the main position of students, making it difficult for students to participate in training in depth, and weak skill survival, which makes the teaching of the course run counter to the goal of talent training in the new era. To this end, the OBE teaching concept is adopted, the training program is set up, the student-centered is highlighted, the visual educational results are set, the teaching is continuously improved, and the expected goal is finally achieved.

C. Lin et al. (eds.), *Proceedings of the 2024 9th International Conference on Modern Management, Education and Social Sciences (MMET 2024)*, Advances in Social Science, Education and Humanities Research 880,
https://doi.org/10.2991/978-2-38476-309-2_42

2 Course Description

Metalworking Practice is a basic practice course[3], which is not only a prerequisite course for students majoring in machinery and near machinery to learn interchangeability and measurement technology, mechanical manufacturing engineering, mechanical design, mechanical principle and other courses, but also an important practice teaching link in the teaching plan of non-machinery majors.It is one of the courses with the highest relevance to the school's idea of "using hands and brains, developing in an all-round way". This course aims to enable students to acquire the basic qualities and abilities that engineers and technicians should possess, including the selection of various materials and blanks and their manufacturing methods; the analysis of process drawings of simple parts, the selection of processing methods and the formulation of process routes; the working principle, structure and basic operation of main mechanical processing equipment; the structure and use of common tools and measuring tools;Interpretation of relevant engineering terms and corresponding technical documents, etc.Through the teaching of this course, students can enhance their perceptual knowledge of mechanical manufacturing engineering, cultivate their scientific style of integrating theory with practice, cultivate their autonomous learning ability, practical ability, ability to solve simple engineering problems and innovation ability, and establish a correct concept of labor.

Metalworking practice courses are closely related to the industry. Most of the students majoring in mechanical engineering enter the related fields after graduation, so they must have solid professional accomplishment and understand the nature and development status of related industries before employment[4].Therefore, metalworking practice courses need to provide students with internship opportunities, so that they can personally enter the relevant contact and understand various technical equipment, enrich their professional knowledge, so as to provide good conditions for their real employment[5].However, the solidified training mode of Metalworking Practice has various problems for a long time, which makes the teaching of this course run counter to the goal of talent training in the new era[6-7].

3 Problems in Course Teaching

3.1 Ideological and Political Education is Not In-Depth

In curriculum education, teachers usually simply teach students the professional knowledge involved, ignoring their ideological and political education, and there is a phenomenon of "emphasizing teaching and neglecting educating people".

3.2 Training Items are Single and Teaching Concepts Remain Unchanged

At present, the training project of metalworking practice in colleges and universities is the processing of duckbill hammers, which is a single project.In the teaching process, it follows the concept of "teacher-oriented, student-assisted", and it is difficult for

students to actively participate in the classroom by means of teacher-performance and student-listening, which does not reflect the modern teaching concept of "student-centered development".

3.3 Insufficient Convergence and Integration Between Types of Work

The content of the course involves a variety of types of work, the knowledge is scattered, the training content of the course is relatively independent, and the cohesion between knowledge points is poor, which leads to students'single and limited understanding of the knowledge of various types of work, can not insight into the internal relationship between the knowledge of various types of work and can not form a complete knowledge system of mechanical manufacturing.They are divorced from reality and do not know "what to learn and why to learn".

3.4 Do Not Pay Attention to the Integrated Training of Students

Under the background of new engineering, the demand for new talents is increasing, and the requirements for training are also improving. However, the traditional teaching mode of Metalworking Practice only pays attention to students' knowledge reserve, and does not pay attention to the integrated training of students' knowledge, ability, practice and innovation, so it is difficult to realize the transformation from knowledge to ability.

3.5 Single Evaluation Method

In the past, there was only teacher evaluation, which ignored the main role of students, weakened students' attention to the process and results of practice, made it difficult for students to find their own problems in time, weakened students' awareness of self-improvement and promotion, and was not conducive to the improvement of students' ability.

4 Solutions and Measures

As a traditional basic course, Metalworking Practice is an effective channel to cultivate students' basic abilities such as autonomous learning ability, practical ability and innovative ability. In order to comprehensively improve the current teaching situation of Metalworking Practice, the course group follows the advanced teaching concept of "student-centered development", adopts project-oriented teaching with high integration of processing technology, innovates teaching forms, reforms evaluation methods, teaches students in accordance with their aptitude, realizes the integrated training of knowledge, ability, practice and innovation, and comprehensively improves the course effect and the quality of personnel training.

4.1 Solutions

According to the learning characteristics of students in the new era, through project traction, using the teaching method of flipping classroom, teachers arrange relevant knowledge points and skills points before class, and provide students with learning resources such as reference books, Mu casses, exclusive online courses (SPOC), etc. Students use online teaching platforms such as Superstar Learning Link, Tencent Classroom and Rain Classroom for self-study. Make students pass the test;In class, students are led to analyze tasks and discuss process routes in groups. On the premise of ensuring safety, students are guided and corrected by teachers to complete project training with the cooperation of teachers and students. Students with good results can be recommended to participate in higher-level development project training. In the process of implementation, evaluation methods should be reformed to increase students'self-evaluation and mutual evaluation.Teachers make the final summary and evaluation; after class to reflect on the course, optimize the teaching process, and constantly improve the teaching effect.

4.2 Measures

Create Production Scenarios and Develop Teaching Projects. Make full use of the platform of "National Experimental Teaching Demonstration Center" Engineering Training Center of Tianjin Vocational and Technical Normal University to create production scenarios and simulate production practice. It develops teaching projects with high integration, strong manufacturability and close to production practice. At present, it has developed many products, such as stamping dies, linear motion mechanisms (as shown in Figure 1), flat pliers (as shown in Figure 2), machine tool fixtures and so on.

Fig. 1. linear motion mechanism

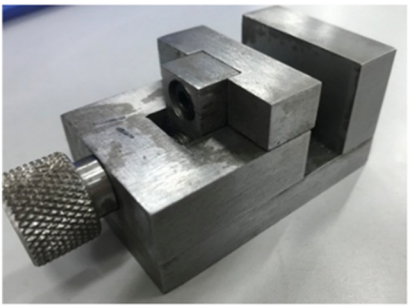

Fig. 2. flat-nosed pliers

Innovative Teaching Forms and Means. Comprehensive use of flipped classroom, project-driven and other teaching modes, the use of autonomous learning method, group discussion method, case analysis method, teaching demonstration method, itinerant guidance method and other teaching methods, flexible use of modern educational

technology means, so that students are more interested in learning, knowledge system is coherent and systematic, can draw inferences about other cases from one instance, and apply what they have learned.

Innovating Evaluation Methods. Adhere to the principle of encouraging and guiding students, innovate evaluation methods, increase self-evaluation and mutual evaluation links, so that students can find their own and other people's problems, find the direction of learning, learn from each other's strengths and weaknesses.

5 Course Teaching Case

Take the threaded hole processing of the "sliding sleeve" fitter module in the linear motion mechanism as an example.

5.1 Release Learning Knowledge Points Before Class

Learn relevant knowledge according to the knowledge points, skill points and assessment points in the project guide. You can use the teaching plan and courseware issued by the guide, or use the network resources to learn, as shown in Table 1.

Table 1. Knowledge of Hole Making

Teaching content	knowledge points	Skill points	Assessment Points
Hole machining	1.Definition of lineation and plane lineation 2.The role of scribing 3.Common tools and applications for marking 4.Selection of lineation benchmark 5.Drilling machine safety operation procedures 6.Drilling movement and characteristics 7.Drilling dosage and its selection 8.Knowledge of drill bit 9.Tap related knowledge 10.Determination of the diameter of the threaded bottom hole before tapping	1. Method of lineation 2. Method of drilling 3. Method of tapping	1.What are the functions of marking? 2.What are the functions of the vernier height gauge? 3.When marking, what is the principle of selecting the marking benchmark? 4.What are the wearing requirements before using the drilling machine? 5.How many degrees is the top angle 2Φ of the twist drill? What are the effects of the size of the vertex angle on cutting?

5.2 Test in Class

Online teaching platforms such as Super Star Learning Link and Rain Classroom are used to answer questions, which can test the results of students'autonomous learning. Students who answer many questions correctly have a sense of achievement, which can mobilize students' enthusiasm for learning, and teachers can encourage them. At the

same time, according to the situation of answering questions, we can understand the situation of students'mastery of knowledge. 80% of the students who answer the questions correctly can carry out practical operation learning, otherwise they will continue to learn theoretical knowledge.

Table 2. Course Evaluation Form

Evaluation content	Evaluation index	Evaluation feedback	Evaluation method
Training Performance	Safe operation: dress standard and operation specification; Civilized operation: standardized equipment maintenance, hygiene standards, standardized placement of tools and measuring tools; Ability performance: strong practical ability, outstanding innovation ability, learning for application, unity and cooperation; Quality reflects: learning initiative, mutual help, good psychological quality, a sense of self-improvement.	Students: find their own shortcomings, find the direction of learning. Teachers: Track student performance and focus on students who are falling behind	Student self-assessment
Keep abreast of the situation	Mastery of knowledge: accurate review of drawings, reasonable formulation of process routes, accurate answers to questions, excellent theoretical assessment; Skills: skilled operation process, accurate measurement, qualified parts processing.	Students: find their own and other people's problems, find the direction of learning, learn from each other; Teachers: point out and correct students, encourage them to think actively and improve their enthusiasm for learning.	Students evaluate each other Teacher evaluation
Assessment results	Quality of workpieces and finished products.	Teacher: Summarize the problems of students and make clear the direction of correction.	

5.3 Issue Training Tasks

(1) Task analysis: The sliding sleeve is one of the main parts of the linear motion mechanism. The outer circle, inner hole and plane of the part are all processed, and now four threaded holes need to be processed.The key point is to ensure that the hole pitch is correct, the center of the threaded hole is perpendicular to the upper surface of the workpiece, and the thread profile is correct. The difficulty is that the threaded hole is symmetrical about the geometric center of the workpiece.

(2) Discuss the process: Divide the students into several groups, and analyze and discuss the processing process of threaded holes in the group.

5.4 Training Process

Students carry out independent training according to self-study knowledge, and give full play to their initiative and initiative. At the same time, teachers should guide students to correct incorrect and non-standard places.

5.5 Curriculum Evaluation

Adhere to the principle of encouraging and guiding students, innovate evaluation methods, increase self-evaluation and mutual evaluation links, so that students can find their own and other people's problems, find the direction of learning, learn from each other's strengths and weaknesses, as shown in Table 2.

6 Course Teaching Innovation Effect

6.1 Pay Attention to the "Penetration" of Ideological and Political Education in Professional Courses

Adhering to the fundamental task of cultivating morality and cultivating people, students are trained to help each other, not afraid of dirty, not afraid of tiredness, and actively work, so as to truly achieve the goal of "learning by doing, doing by learning".

6.2 Students are Active in Learning and Have a Firm Grasp of Knowledge

Taking students' development as the center, making full use of teaching resources, defining students' learning objectives, guiding students to index knowledge, find problems and solve problems independently, effectively enhancing students' interest and initiative in learning, and making their mastery of knowledge more solid and systematic.

6.3 Effective Improvement of Comprehensive Ability

Students have mastered the necessary system knowledge, and can apply the knowledge to practice, establish safety awareness, quality awareness, economic awareness, innovation awareness, market awareness and management awareness, and effectively improve students' engineering practice ability and engineering literacy.

6.4 The Teaching Method Has Strong Universality and Operability

The implementation of the innovative process of curriculum teaching stimulates the enthusiasm of students, promotes students' thirst for knowledge, urges teachers to follow the development of the times, and realizes "double improvement" through project guidance, which not only improves students' comprehensive ability, but also improves teachers' teaching ability, and has strong universality and operability of teaching

methods. It provides ideas for the curriculum reform of theoretical teaching, practical teaching and the integration of theory and practice, and has certain promotional value.

7 Conclusion

The innovative design of curriculum teaching is guided by project teaching, which changes "teachers speak, students listen "into" students do, teachers guide", and realizes "unity of knowledge and practice". Through group discussion and practical exploration of existing tasks, students can think actively with their hands and brains, and their learning ability, engineering practice ability and innovation ability can be effectively improved. Students advocate skills, love skills, learn to "do things"in learning, and learn to "behave" in doing things.

Acknowledgements

2023 Key Project of the Research Plan on Undergraduate Teaching Quality and Teaching Reform in Tianjin Ordinary Colleges and Universities [Project No. 2020A231005501]; In 2021, the Ministry of Education of the People's Republic of China (MOE) won the second batch of national vocational education teacher teaching innovation team research projects [Project No. ZH2021020201].

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