

# Reform and Exploration of Curriculum Ideology in Engineering Training I under the Background of New Engineering and Technology

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**Abstract:** With the implementation of "Made in China 2025" and the launch of "New Engineering and Technology" construction, higher requirements are put forward for the engineering training of college students to cultivate their practical innovation ability and engineering literacy. The teaching quality of engineering training directly relates to the quality of talent cultivation in universities and colleges. This article, from the perspective of "curriculum and ideology", innovatively proposes the teaching concept of "three-in-one, two-two linkage", explores and studies how to improve the teaching quality of engineering training from aspects such as curriculum system, teaching mode, bringing ideology into classroom, and building online resource library. With this guidance, each student can establish a correct outlook on life and values, and cultivate a new era craftsman spirit of being rigorous, focused, meticulous, and pursuing excellence.

**Keywords:** Engineering Training; Curriculum and Ideology; Teaching Reform;

## 1 Introduction

The construction of "new engineering" platform is a new direction for the development of university engineering education proposed in 2017. It is put forward to deal with the contradiction between the rapid development of industrial demand and the shortage of advanced technical personnel. It is an important measure to lead the transformation of China from a big country in higher education to a great power in higher education [1]. At present, all colleges and universities have done a lot of work for the construction of their own "new engineering" professional platform. Engineering Training, as an important part of practical teaching and an important means of linking theory with practice, is an important support for cultivating students' engineering skills and engineering literacy, and is the cradle of future engineers. All along, engineering training courses focus on how to cultivate students' hands-on ability and practical ability, and the training objectives are set according to the standards of engineers, ignoring the cultivation of students' engineering literacy and engineering thoughts in the teaching process. With the introduction of the Guiding Outline of Ideological and Political Construction in the Curriculum of Colleges and Universities, it has become an issue that must be considered in teaching as to what kind of person, how to train students and for whom to train students [2], and we must integrate value shaping, knowledge imparted and ability cultivation [3]. Therefore, the teaching content of engineering training also needs to be reformed in the aspect of "curriculum thinking and politics", adding new "ideological and

political elements" to the traditional teaching mode, so that students can learn engineering skills while learning the course of "Engineering Training", and have craftsman spirit and patriotic feelings. Combine the teaching content of engineering training with the cultivation of students' ideological and moral level, so that students can combine their learning and thinking, and unify their knowledge and practice.

Encourage students to learn from our outstanding predecessors through vivid ideological and political teaching cases. Learn their spirit of assiduous study and not afraid of difficulties; Learn from them, the courage to overcome difficulties. While participating in engineering training and learning practical skills, emphasis is placed on strengthening students' engineering ethics education, cultivating students' spirit of "great craftsman" of excellence, and inspiring students' feelings and mission of serving the country with science and technology [4].

## 2 Ideological and political curriculum reform of Engineering Training I

Engineering Training I, originally called metal Engineering Training, is short for Metal technology training. Now it is a compulsory practical basic course for engineering majors in universities. The purpose of engineering training is to enable students to establish quality awareness, innovation awareness, environmental awareness, team awareness and safety awareness through contact with engineering environment and industrial production. Lay the foundation for future professional study and social work. At present, the practical training content of "Engineering Training I" is divided into the following three categories according to the processing characteristics:

- (1) Traditional cold processing (turning, milling and grinding pliers);
- (2) Traditional hot processing (casting heat treatment welding);
- (3) Advanced manufacturing technology<sup>[5]</sup>(CNC digital coding electromechanical advanced manufacturing); As shown in **Figure 1**:



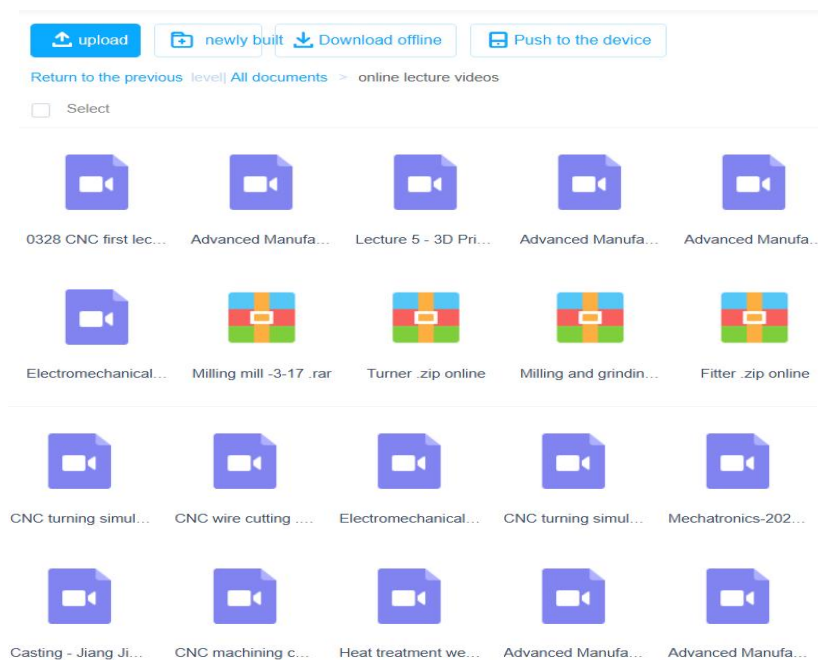
**Fig. 1.** Current practical training content of Engineering Training I

In view of the existing problems in engineering training, the following reform measures have been adopted.

## 2.1 Teaching model innovation

The "trinity, pin-two linkage" ideological and political teaching mode of engineering practical training I course constructed by this research project is different from traditional teaching. It can realize the organic connection of the three dimensions of "online, offline and after-school", and the effect of "ideological and political theory teaching + social practice" and "professional teaching + professional practice". The innovation is also reflected in the full use of online teaching platform, Internet and new media teaching technology to replace the traditional boring oral teaching of ideological and political content with graphic online video display.

The teaching mode satisfies the interest orientation of the post-00s "network natives" of contemporary college students, and makes it easier for the content of ideological and political education to penetrate into the hearts of students and have a far-reaching impact. At the same time, the "curriculum ideological and political resource library" initially constructed by this subject can meet the learning needs of students in the whole process before, during and after class. Students can log in to the resource library of the center for preview before participating in the training. The resource library includes 16G video materials for learning operational skills, as well as patriotic education content of "great power craftsman". The database is shown in **Figure 2**:



**Fig. 2.** Video preview resources and knowledge expansion

After the completion of offline learning, students can also learn the online expansion content of each module after class. The daily thought and politics and classroom thought and politics form a complete closed loop of curriculum thought and politics, so as to realize the model innovation of subject research. The ultimate teaching goal of ideological and political reform is: Through the "trinity, pin-two linkage" curriculum ideological and political reform program, to help college students establish a lofty belief in the great ideal of socialism, in line with the report of the 19th National Congress of the Party proposed "building a knowledge-oriented, skilled, innovative labor force, promote the" model worker spirit "and" craftsman spirit ".

## **2.2 Teaching content innovation**

Under the ideological and political framework of "New Engineering", a "trinity, pin-two linkage" curriculum ideological and political practice teaching model is formed, and diversified ideological and political work objectives such as personality building, innovation ability training and guiding students to develop positive value concepts are distributed in different stages and different teaching modules of engineering training links. In the implementation process, through continuous improvement of teaching methods, innovative models, rich ideological and political elements and cases, in order to cultivate students with good engineering quality, a strong sense of social responsibility, the pursuit of excellence work mentality, to achieve "moral cultivation" as the basic teaching task. To promote the "engineering training" teaching process of ideological and political education explicit and implicit connotation of effective combination. The specific implementation methods are as follows: teaching team members focus on preparing lessons and establishing online courses. Through the centralized preparation of lessons, the establishment of a unified teaching plan, curriculum standards, in-depth exploration of the ideological and political elements contained in the "Engineering Training I" course, the introduction of relevant cases. Establish online classes through online platforms, build online quality resource libraries, present classic cases, timely publish.

## **2.3. Reform ideas and ways to achieve**

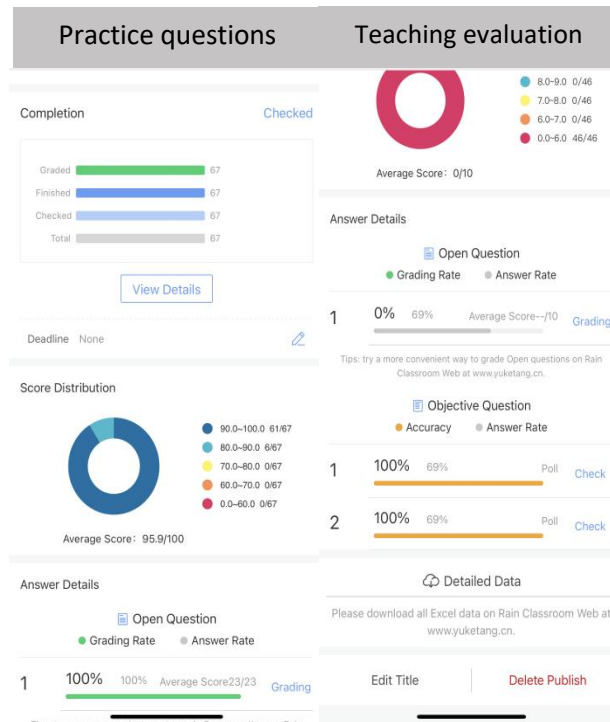
The idea of the ideological and political teaching mode of the "Engineering Training I" course is based on "trinity, pairwise linkage".

The first step: Students learn independently online and complete the learning tasks assigned by the teacher. Before class, teachers assign learning tasks for the next class on the platform, and open modules such as "live online class" and "live practical training" to guide students to carry out online simulation practice with tasks and offline independent operation practice to ensure the combination of online and offline. The advantage of the combination of online and offline autonomous learning is that students can watch the knowledge points they do not understand repeatedly, and are not subject to time constraints. A large number of online audio-visual materials can broaden students' horizons and arouse students' interest in learning. At the same time, the model practical operation makes up for the limitation of the theoretical content, and helps the students to master the operational skills and improve the operational ability in the follow-up offline practical operation courses.

Step 2: Flipped teaching and flipped classroom in class. The teacher should complete the practical training teaching management in offline teaching, check the omissions and fill in the

gaps, explain the heavy and difficult content that is not explained in detail in online classroom teaching, handle the practical operation difficulties step by step, raise the problems that are easy to occur in online classroom teaching, and check the mastery of practical training and practical operation skills in time. The teaching naturally permeates the feelings of family and country into all aspects of teaching, while emphasizing the cultivation and promotion of students' professional ethics, unity and cooperation spirit, creativity and social responsibility.

Step 3: Review after class. Teachers use the "Rain Class" platform to publish homework review after class to consolidate classroom teaching. The online learning platform can guarantee the automatic evaluation and grading of objective questions, and shorten the time for teachers to correct homework. At the same time, the big data statistical function of the platform is utilized to conduct comprehensive statistical analysis and calculation of students' learning time, classroom interaction, questioning and feedback, etc., so as to provide a data analysis basis for teachers to objectively evaluate students' learning effects. As shown in **Figure 3**:



**Fig. 3.** Teachers use the "Rain Classroom" platform to teach

In addition, teachers also use the interactive tools of the network platform to solve thinking problems, value problems and emotional problems for students anytime and anywhere. Shoot and collect a variety of actual production examples of mechanical processing and edit them into special videos, and upload them to the special website of the Industrial Training Center:

Engineering Training Center (tjut.edu.cn), so as to facilitate students to pay more attention to, fully understand and love what they have learned while learning by themselves.

In order to test the results of teaching reform, we conducted a satisfaction questionnaire survey on students who participated in engineering training at level 2022 (before the reform) and students who participated in engineering training at level 2023 (after the reform). The survey results are shown in Figure 4:

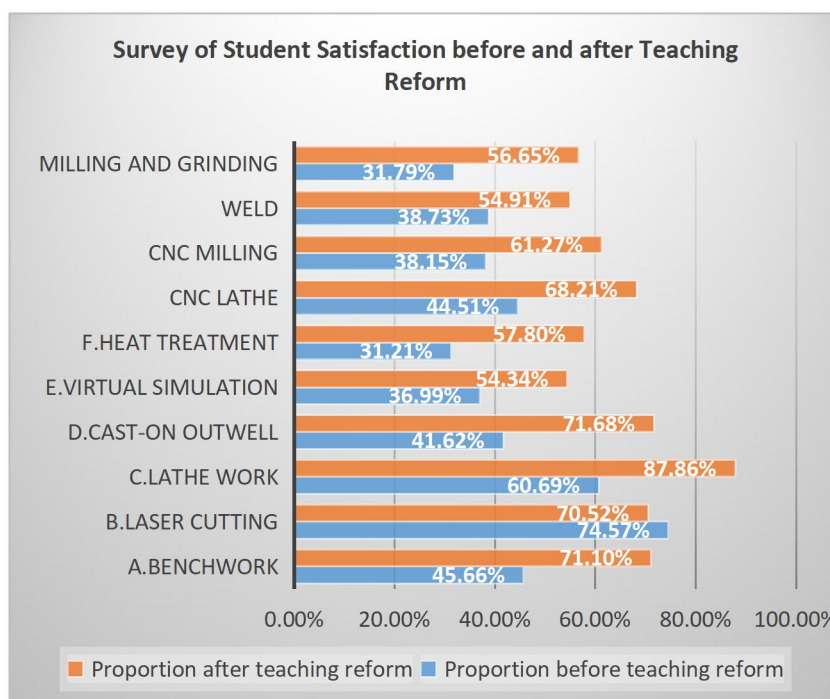


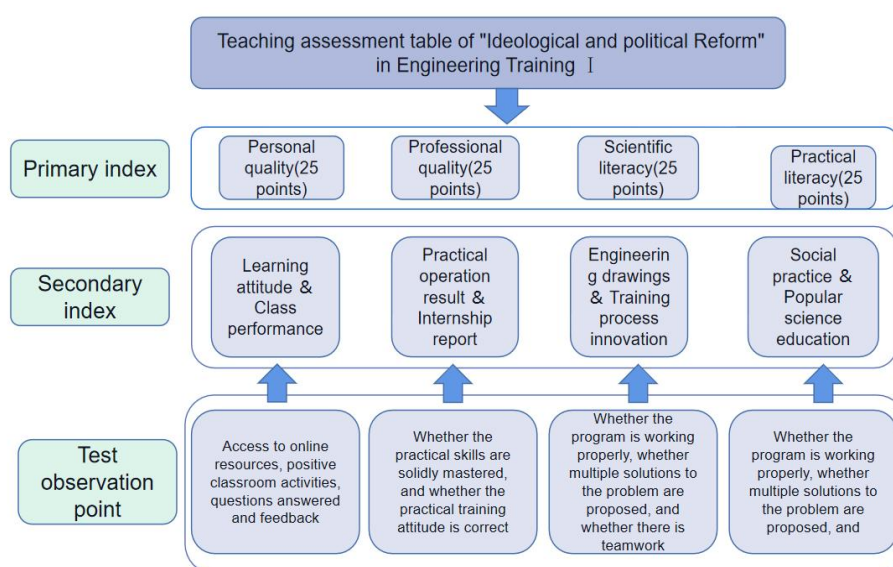
Fig. 4. Comparison of Student Satisfaction Survey Results before and after Teaching Reform

### 3 "ideological and political reform" teaching assessment and evaluation standards

Curriculum assessment is the baton for the evaluation of teaching reform results. Only by adding condensed ideological and political elements such as personal literacy, professional literacy, scientific literacy and practical literacy into the curriculum assessment can teachers' teaching achievements in engineering training be effectively supervised and relevant norms and requirements of practical training be emphasized<sup>[6][7]</sup>. The purpose of teaching evaluation is to find out the effect of curriculum ideological and political reform and its significant impact on learners, so as to optimize the design and implementation of curriculum ideological and political reform according to evaluation. In the concrete implementation, it is necessary to formulate curriculum ideological and political evaluation norms and establish relevant mechanisms. Using the existing "Mycos quality platform" message evaluation mechanism, understand and pay attention to the students' feelings after the teaching reform, compare the

teaching gap before and after<sup>[8][9]</sup>. Use the learning feeling to grasp the students' absorption of the course content and so on. Through students' comprehensive evaluation and feedback on course content, educational means, teaching volume and other aspects, timely adjustment and optimization of curriculum ideological and political design. At the same time, it guides teachers from the same school and peers into the classroom, and guides the construction of school curriculum ideological and political education by listening to lectures and evaluating lessons<sup>[10]</sup>. This topic takes Mycos quality platform as the evaluation carrier, and the evaluation system is designed as follows:

The ideological and political evaluation content of Engineering Training I course can be divided into four first-level indicators and eight second-level indicators, and each first-level indicator corresponds to two second-level indicators and is matched with observation points for ideological and political evaluation. Each first-level index was assigned 25 points, and each specific evaluation observation point accounted for 5 points, which was used to evaluate the specific effect of curriculum ideological and political construction. Its main contents are shown in Figure 5:



**Figure 5.** Teaching assessment table of "Ideological and political Reform" in Engineering Training I

Evaluation criteria: a score of 90 or above is excellent, and a score of 70 or above is qualified.

#### 4 Conclusion

The ideological and political teaching reform of engineering training comprehensively uses the current advanced teaching concepts, and embodies the student-centered training mode in each module of daily teaching. In accordance with the requirements of the development of the country's "new engineering", we train qualified engineers for the country and improve their

engineering literacy at the same time, so that students can improve their practical skills and increase their cultural knowledge, and have the spirit of patriotism and craftsmanship, so that they can better integrate into the society and make their own contribution to the country in the future.

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