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Article

Design of ideological and political teaching mode of "Engineering Ethics" course with relevance to biomechanics under OBE educational concept

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Abstract: Under the guidance of the OBE educational concept of "student-centered, output-oriented and continuous improvement", this article discusses the ideological and political teaching objectives, teaching contents, teaching models, teaching methods, assessment mechanisms, and promotion strategies of the "Engineering Ethics" course, particularly emphasizing its relevance to biomechanics. The overall teaching design was carried out by integrating biomechanical principles into the curriculum framework. Feedback from teaching evaluations indicates that this teaching framework has achieved a high degree of realization of curriculum objectives and produced positive teaching outcomes, providing a demonstration and reference for other curriculum reforms in related fields.

Keywords: OBE educational philosophy; Engineering Ethics; biomechanics; curriculum ideology and politics; instructional design; assessment and evaluation

1. Introduction

In May 2022, the Third World Conference on Higher Education was held in Barcelona, Spain. The conference put forward the basic principles for the future development of higher education and the main direction of major changes, and pointed out the educational concept that deeply integrates "educating people" and "educating talents". It is the key to the sustainable and harmonious development of future society, and emphasizes the need to establish an educational development model that provides a more comprehensive experience centered on student learning and development [1,2]. China's higher education aligns with the general trends of international development while also exhibiting distinctive Chinese characteristics. To respond to the new round of scientific and technological revolutions and industrial transformations, and to cultivate high-quality international engineering and technical talents, a new concept of "four new" construction—including new engineering, new medical science, new liberal arts, and new agricultural science—has been proposed [3–8]. These concepts share common characteristics aimed at educating individuals through the core educational philosophy of "adhering to the fundamental task of cultivating people by virtue and taking a student-centered, output-oriented, and continuous improvement approach". In light of the professional certification of engineering education and the construction of "new engineering", this study investigates the integration of OBE (Outcome-Based Education) with practical experiences from teaching the "Engineering Ethics" course to graduate students majoring in electronic information, particularly focusing on its relevance to biomechanics. This paper explores a new teaching reform model that combines "educational philosophy + curriculum ideological and political education" to support the achievement of the ideological and

political teaching goals of the "Engineering Ethics" course within this discipline [9–14].

2. The necessity of integrating OBE concept into ideological and political teaching of "Engineering Ethics" course

"OBE" is the abbreviation of Outcome-Based Education, which means output or result-oriented education. It originated from the basic education reform in the United States and Australia in 1980s and is considered as an innovation of educational paradigm. At present, OBE is the leading idea of educational reform in most countries, and it has been actively promoted and widely recognized in Chinas higher education. OBE educational philosophy is an advanced educational philosophy that maximizes students expected learning outcomes as the output orientation to design the activity process. Emphasize the student-centered evaluation, the achievement of students' needs as the target evaluation, and the reverse thinking to drive the operation of education and teaching activities; Focus on the mastery of students learning state and learning process and the realization of each stage's goals, so as to promote educators to continuously improve educational methods and teaching modes, so as to improve the effect of education and teaching. OBE education concept is the mainstream concept of current education reform, and the certification requirements of engineering education specialty are carried out around the core task of "achieving students graduation ability", which is the embodiment of OBE as the core concept, and it is also in line with the new demand of new engineering construction for talent cultivation [15,16].

Engineering Ethics education arose in colleges and universities in developed countries such as Europe and America in 1970s, and is an important part of higher engineering education. "Engineering Ethics" is a comprehensive course covering science and humanities education, which belongs to the emerging discipline of philosophy, ethics, engineering and sociology. In the practical sense, Engineering Ethics education aims to cultivate and enhance the professional ethics consciousness of engineering practitioners, understand and master the engineering professional behavior norms, enhance their sense of social responsibility, and improve their judgment and willpower to solve ethical problems in engineering practice. At present, Engineering Ethics education has become an important content in international engineering education certification. The course construction of "Engineering Ethics" in China started in 2014, aiming at speeding up the cultivation of ethical quality requirements of modern engineering and technical talents to adapt to and lead the construction of new engineering disciplines, and implementing the fundamental task of cultivating people with virtue [17,18].

In recent years, with the rapid development of science and technology and the deepening of engineering practice, modern engineering practice has profoundly changed peoples' production and lifestyle and promoted the development of human society. At the same time, ethical problems and conflicts in engineering practice have become more and more prominent. In particular, the long-standing one-sided talent evaluation view of "emphasizing wisdom over morality" often only pays attention to technical problems and unilaterally pursues economic interests in engineering

activities, resulting in the destruction of ecological environment and frequent social ethical problems. The ideological and political education of "Engineering Ethics" course lies in cultivating the ethical awareness of future engineering practitioners, strengthening their sense of social responsibility, always putting the safety, health and well-being of the public in the first place, and becoming responsible compound engineering and technical talents.

OBE educational concept is the expansion of ideological and political teaching mode of "Engineering Ethics" course, and its application in it will surely become a powerful measure of engineering education and teaching reform.

3. Practice design of ideological and political teaching of "Engineering Ethics" course under OBE education concept

3.1. Instructional design framework structure

Based on the background of new engineering construction, under the guidance of OBEs educational concept of "student-centered, output-oriented and continuous improvement", the ideological and political teaching design of "Engineering Ethics" course should be combined with the course teaching content and build a closed-loop logical structure of course teaching around three issues. That is, through teaching "what kind of effect is expected to achieve", "how to achieve the expected effect" and "whether to achieve the expected effect". As shown in **Figure 1**.

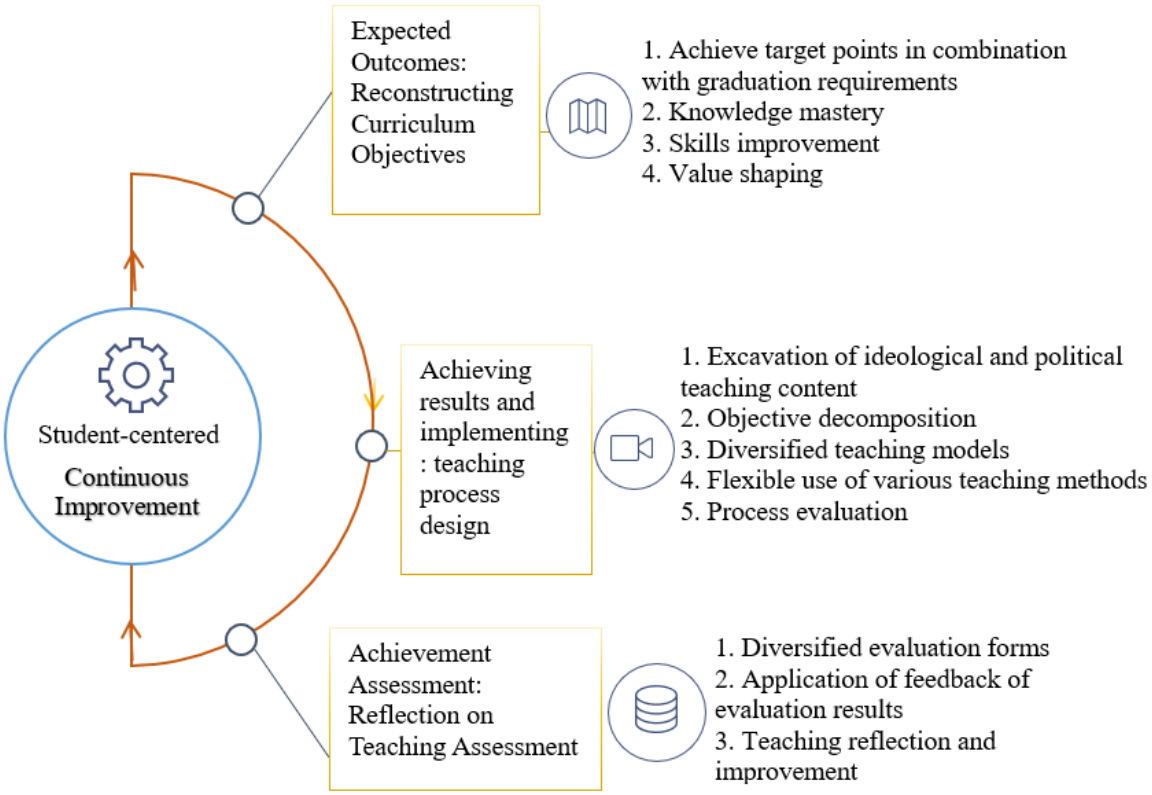

Figure 1. Logical structure of ideological and political teaching of "Engineering Ethics" course based on OBE concept.

First, the goal design of ideological and political teaching of achievement-oriented curriculum should be based on the achievement output demand that students expect to achieve in learning. Taking the achievement of the expected goals required by graduation as the foothold, according to Blooms teaching goal classification principle, the curriculum expected learning achievement goal system is divided into three levels: Knowledge mastery, skill improvement and value shaping, which determines the implementation of the curriculum teaching process and the design of results evaluation methods.

Secondly, according to the requirements of teaching objectives, we should organize the teaching process design integrated into ideological and political education with students as the center, pay attention to process testing and evaluation through various teaching methods and means, strengthen the construction of teaching resource case library and software and hardware, constantly stimulate students learning motivation, and strive to achieve the expected learning results.

Thirdly, evaluate and reflect on whether the expected teaching results have been achieved. The evaluation is guided by the curriculum objectives, adopts diversified evaluation methods and effective technical means to fully reflect students learning effects, and continuously improves various indicators of curriculum teaching according to the evaluation results and feedback, forming a benign closed-loop operation of teaching.

3.2. Teaching practice process

3.2.1. Reconstruct the teaching objectives of the curriculum

According to the American engineering ethicist Davids [19], the goal of Engineering Ethics education is summarized into four aspects: First, to improve students moral sensitivity in engineering practice, second, to increase students awareness of engineering industry behavior standards, third, to improve students judgment on Engineering Ethics, fourth, to strengthen students willpower of Engineering Ethics, So as to achieve the training goal of "consciousness-norm-ability" of engineering and technical talents. For the teaching effect integrated into curriculum ideological and political education, it is necessary to reconstruct the curriculum teaching objectives, and establish the expected teaching effect in three dimensions based on the requirements of the original professional curriculum training objectives, namely, the requirements of curriculum ideological and political teaching objectives of "knowledge mastery", "skill improvement", "value shaping" and "trinity", paying attention to both knowledge and skills imparting and value guidance. Engineering Ethics education not only pays attention to the improvement of engineers' personal moral quality, but also devotes itself to strengthening engineers' sense of social responsibility, promoting sustainable development, and coordinating the interests of various social groups, so as to make ethical choices in practical work and maintain social stability and harmony. As shown in **Table 1**.

Table 1. Ideological and political teaching objectives of "Engineering Theory" course under OBE concept.

Target dimension	Teaching objective
Knowledge mastery	Starting from cultivating students' awareness and sense of responsibility of Engineering Ethics, we should promote students to deeply understand the basic concepts and theories of Engineering Ethics, systematically grasp the basic norms of Engineering Ethics and the ethical requirements of specific engineering fields, and cultivate students' professional ethics with the current mainstream values and ethical thoughts and codes of conduct.
Upskilling	On the premise of mastering the basic theories and methods of Engineering Ethics, students can improve their ability to identify engineering risks, ethical judgment and willpower, learn to rationally deal with and treat ethical problems in professional fields with dialectical ethics and scientific development concepts, comprehensively improve their decision-making ability of Engineering Ethics, and effectively solve complex ethical problems in engineering practice.
Value shaping	Enhance students' sense of social responsibility and consciousness of practicing socialist core values in a subtle way, improve their ideological and political consciousness of giving priority to public safety and well-being, cultivate the craftsman spirit of a great country who strives for excellence, stimulate the feelings and mission of serving the country through science and technology, and realize the educational task of moral education.

3.2.2. Optimize the teaching content of the course

Based on the OBE educational concept, combined with the textbook structure of Engineering Ethics for graduate students majoring in electronic information, the course content is divided into three modules: Theoretical knowledge part, methodology part and professional practice part. According to the knowledge points of each module, the ideological and political education elements are mined and refined and integrated into the teaching process of the corresponding course content. The teaching content design is shown in **Table 2**. At the same time, we should build auxiliary teaching resources that match the teaching content, combine theoretical knowledge imparting with concrete practical teaching, fully mobilize students' enthusiasm and participation in learning, and reflect students' dominant position in teaching. Through curriculum teaching, the value guidance "moistens things quietly" is embodied in knowledge transfer and skill cultivation.

Table 2. Design of ideological and political teaching content of "Engineering Ethics" course under OBE concept.

Content module	Knowledge Points	Contact points of ideological and political elements	Expected effect
Theoretical knowledge: Basic concepts, basic theories, ethical values and basic principles of handling	Introduction to Engineering Ethics	1) Sociality of engineering practice; 2) The importance of engineers' ethical literacy and social responsibility.	1) Deeply cultivate professional and patriotic feelings; 2) Cultivate a sense of professional responsibility and mission; 3) Stimulate the desire and confidence in learning professional courses.
	Engineering and Ethics	1) The relationship between personal morality and the formation of ethical consciousness; 2) The relationship between ethical dilemma handling and values.	1) Cultivate the awareness of Engineering Ethics; 2) Correctly understand the relationship between people, society and nature; 3) Establish the view of right and wrong in Engineering Ethics.

Table 2. (*Continued*).

Content module	Knowledge Points	Contact points of ideological and political elements	Expected effect
Methodology: How to Identify Ethical Problems in Engineering Practice	Risk, Safety and Responsibility in Engineering	1) Awareness of engineering responsibility; 2) A sense of engineering mission to protect public safety, health and well-being; 3) Legal responsibilities of stakeholders.	1) Cultivate due professionalism; 2) Stimulate social responsibility and mission; 3) Improve the ability to respond to emergencies; 4) Understand thought on the rule of law.
	Value, Benefit and Justice in Engineering	1) The relationship between the value interests of engineering science and technology activities and social and political issues; 2) Social ethical issues faced by different objects in engineering practice.	1) Correctly understand the relationship between engineers' code of conduct and public well-being; 2) Establish a sense of rules; 3) Be virtuous, observe public morality, and be strict with private morality.
	Environmental ethics in engineering activities	1) Lucid waters and lush mountains are invaluable assets; 2) Harmonious coexistence between man and nature; 3) New development stage and new development concept.	1) Establish ecological awareness of modern engineering; 2) Cultivate the engineering environmental ethics of sustainable and coordinated development;
	Professional ethics of engineers	The Close Relationship between Knowledge, Ability and Personal Accomplishment in Engineering Activities.	1) Improve the professional quality of engineers; 2) Practice the core values of socialism; 3) Science and Technology News National Feelings and Mission Responsibility.
Professional practice: Through case analysis, improve the judgment and decision-making power of Engineering Ethics in this professional field	Information and Big Data	1) Collection and application of big data during the epidemic; 2) Information and data security issues; 3) Value utilization of big data; 4) Personal privacy protection; 5) The importance of teamwork.	1) Demonstrate self-confidence in the socialist system with Chinese characteristics and put peoples interests first; 2) Enhance scientific and technological self-confidence and national self-confidence; 3) Adhere to technical ethics and professional ethics; 4) Cultivate the pioneering and innovative craftsman spirit; 5) Enhance social responsibility; 6) Establish scientific ethical awareness and ethical decision-making methods.

3.2.3. Hybrid curriculum teaching mode

Based on the OBE concept, the teaching form of "Engineering Ethics" adopts the "3 + 2" hybrid ideological and political teaching mode of online and offline mixture and in-class and extracurricular linkage (as shown in **Figure 2**), that is, three links of "before class + during class + after class" and two ways of "online (teaching platform)" + "offline (first classroom + second classroom)", which highlights the teaching effect orientation, is task-driven, teacher-led and students-oriented, stimulates students learning enthusiasm, cultivates innovative thinking and improves teaching quality.

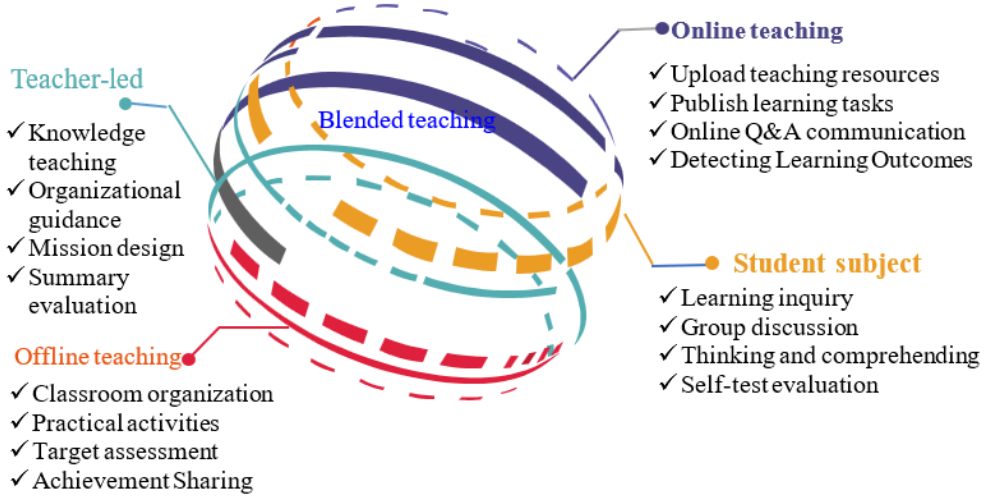

Figure 2. "Engineering Ethics" and "3+2" hybrid curriculum ideological and political teaching model.

Pre-class link: Teachers assign preview tasks to guide students to think and explore. Teachers upload teaching resources and publish learning tasks through the online learning platform of school curriculum, and limit students to complete them within the specified time. In addition to the basic knowledge points of the course, online teaching resources are also assisted by attractive contents such as short videos, film and television clips, news materials, case studies, etc. Each material content is combined with the key points of ideological and political education in the chapter. Students complete self-study tasks through online learning and testing, exchange and discussion, and consulting materials. Teachers summarize and summarize students preview situation, and consciously give feedback in class.

Classroom: Teachers leads the intensive lecture of knowledge points, and students discuss and exchange in groups. Teachers use multimedia and other teaching methods and means to teach the key ideological and political teaching contents of the curriculum, create situations, and promote students understanding, digestion and absorption. Students are divided into several study groups, and share the research results through online or offline discussions, cooperative learning, reports, and then collectively appreciate and comment on each other. Teachers inspect and record the discussions and speeches of each group, comprehensively score the speeches and summarize them one by one, which greatly stimulates students' enthusiasm for participation and cultivates collaborative spirit and teamwork ability.

After-class link: Teachers follow up and consolidate, and students expand and improve. Teachers publish online exercises according to the teaching content, detect and deepen the mastery of unit knowledge, understand students learning status, adopt targeted teaching improvement and promotion, and answer questions and guidance online in real time. At the same time, connect with the second classroom, expand the training tasks, and strengthen the application of theory into practice. Relying on the practice platform inside and outside the school and the special quality engineering projects, we will guide graduate students to apply for scientific and technological innovation projects, carry out social practice investigations, make selective field visits and inspections, and participate in discipline competitions, etc., and build a practice

teaching system of Engineering Ethics education in the second classroom, so as to further guide students to think deeply about Engineering Ethics issues and strengthen their determination to serve the country through science and technology.

3.2.4. Multiple course teaching methods

The application of ideological and political teaching methods in curriculum based on OBE concept should be fully reflected in students' subjectivity and participation in the teaching process, pay attention to students' skill cultivation and the achievement of curriculum goals, and comprehensively use case teaching method, group discussion method, scenario simulation method, project-driven method and other teaching methods and methods.

1) Case teaching method: The attribute of Engineering Ethics course is very practical. Closely combining the positive or negative typical cases in engineering practice activities to carry out teaching analysis of Engineering Ethics will help students to feel the new achievements of engineering technology development, actively guard against the possible negative impact of engineering activities on society and nature, and consciously strengthen professional ethics cultivation. By selecting typical cases in the field of engineering science and technology at home and abroad, the case database of course teaching resources is constructed. In the teaching process, according to the course content, students are deeply analyzed and guided to actively think about the Engineering Ethics knowledge and ideological and political elements contained in the cases, so as to enhance students' professional self-confidence and social responsibility, and cultivate students' ethical judgment and decision-making ability.
2) Group discussion method: It is an effective method for postgraduate teaching to discuss a certain topic in the form of team cooperation and meet the teaching requirements of course unit content. Teachers can organize students to discuss hot issues in the field of engineering in groups, analyze the key points of Engineering Ethics knowledge, form the discussion conclusion of the group, and then share the views of each group in the class and analyze the objections. In the process of completing the discussion of problems, the student group consults relevant materials by themselves, completes the study of course content, guides active thinking, promotes the understanding and mastery of knowledge, cultivates the team spirit, and exercises the ability of problem analysis and problem solving and language expression.
3) Scenario simulation method: Select typical cases of engineering accidents, especially engineering events with ethical conflicts and ethical decision-making dilemmas, analyze the existing stakeholders, and let students simulate and play different professional roles, so that the scenes in the cases can be reproduced. Through heated debates, all stakeholders who play the role truly experience and feel the attitudes and ideas of the role in this ethical issue event, and how to make correct ethical decisions in the way of "greatest goodness". By participating in the role simulation, I deepened my understanding of the course knowledge content, and exercised and improved my professional skills.
4) Project-driven method: Postgraduate teaching should highlight inquiry, and stimulate them to cultivate innovative thinking by actively thinking about

solutions to active demand problems. Project-driven method means that teachers design specific projects of engineering practice. Students can set up study groups, visit enterprises to carry out research, consult relevant literature, or conduct project experiments to explore solutions to project problems, form project research results, strengthen students' application of curriculum knowledge, enhance students' professional recognition and improve students' practical ability.

4. Assessment and evaluation of ideological and political teaching of "Engineering Ethics" course under OBE teaching concept

Based on the OBE concept, an evaluation mechanism for achieving the ideological and political goals of the "Engineering Ethics" course is constructed, which integrates the usual process evaluation and the final result evaluation, implements the combination of student self-evaluation, student-student mutual evaluation and teacher evaluation, adopts the promotion of evaluation and incentive, and pays attention to the three-dimensional collaboration of "knowledge, ability and literacy".

4.1. Composition of evaluation system

Students course achievements are mainly composed of two parts: Usual academic achievements and final exam achievements, accounting for 40% and 60% respectively. Usually, the process evaluation focuses on students' performance in the course learning process. The observation points not only pay attention to students' mastery of knowledge points and ability cultivation, but also pay attention to students' value guidance and ethical literacy improvement. The main detection forms are: Learning participation, online practice and group homework. The result assessment of the final examination paper comprehensively examines the degree of internalization of students' knowledge, with various questions, including cognitive ability assessment and problem analysis ability assessment. The composition of the evaluation system is shown in **Table 3**.

Table 3. Composition of the evaluation system for the achievement of ideological and political goals of the "Engineering Ethics" course under the OBE concept.

Curriculum Objective Dimension	**Assessment method and weight**			
	Course Learning Participation	**Platform Online Practice**	**Study group assignments**	**Course final exam**
	15%	**10%**	**15%**	**60%**
Learning attitude	0.6	0.15	0.1	
Knowledge mastery	0.1	0.5	0.1	0.2
Teamwork spirit	0.05		0.5	
Comprehension and analysis skills	0.1	0.1	0.1	0.2
Problem-solving skills	0.05	0.1	0.1	0.3
Comprehensive practical ability	0.1	0.15	0.1	0.3
∑	1	1	1	1

1) Evaluation of course learning participation. It mainly evaluates students' performance in the process of classroom teaching, including class attendance, random questions, discussion and speech, lecture status, etc., sets specific evaluation scoring standards, records various learning behaviors in detail, and calculates the score of each student statistically at the end of the semester. It is a target assessment of students' literacy improvement and knowledge mastery promotion, and emphasizes descriptive evaluation of students' attitude and knowledge application in curriculum learning. It aims to stimulate students' enthusiasm for professional learning, improve their enthusiasm and participation in classroom activities, and cultivate their independent thinking ability and knowledge understanding.
2) Online practice testing on the platform. The online teaching platform of the course is equipped with unit chapter content. In addition to the teaching topic content, each knowledge unit also has chapter exercises, test questions, video materials, homework and knowledge expansion sections. The personal data record of online practice on the platform mainly includes students' completion of exercises, homework, video watching, etc. and the statistical scores of test questions system. By setting the weight of each plate item, according to students learning data, we can know students' achievement of learning objectives of each unit. This test mainly assesses students learning attitude and literacy, unit knowledge mastery and cognition and understanding ability.
3) Study group homework evaluation. At the beginning of class, teachers divide students into several study groups, and assign students homework completed in groups after class according to the teaching content of each knowledge unit. There are two main types: One is case discussion, in which teachers publish the case content online, and the group members complete the work and submit the discussion results, or report and share them in the classroom in the form of PPT; or conduct role-playing to intuitively analyze the case plot; or organize debates among groups to explain the views of all parties. The second is the research report. The group designs and submits the research plan, conducts on-the-spot visits and inspections based on the optional themes of the course learning content, forms a research report and reports and exchanges. Teachers formulate assessment index points and scoring standards, and the group leader scores the group members according to their performance and contribution. At the same time, the students make an overall evaluation of the reports of each other group, with the weight of each group accounting for 50%. Focus on assessing students' teamwork spirit, guide students to deeply participate in learning, and flexibly apply knowledge to engineering practice.
4) Assessment of the final examination paper of the course. The final examination questions are mainly open-ended questions, which comprehensively examine students' professional knowledge mastery, cognitive ability, identification ability and ability to solve ethical dilemmas by using ethical norms and methods, and gain insight into students' ethical positions. The types of examination questions are: Short answer questions, multiple-choice questions, discrimination questions, case analysis questions, etc. As an engineering practitioner, students should

firmly establish a sense of social responsibility and mission, and actively practice socialist core values in engineering practice.

4.2. Analysis of goal achievement degree

The evaluation and analysis of curriculum goal achievement degree can quantitatively measure the source data of the goal assessment items through formulas, so as to quantitatively evaluate the learning achievements of students' professional education and curriculum ideological and political education, analyze the positive effects and existing shortcomings, and feed them back to the improvement and promotion of teaching [20].

The formula for calculating the achievement degree of course goal *i* is:

$$D_i = \frac{\sum_{j=1}^{n} Q_{ij} \frac{A_{ij}}{B_{ij}}}{\sum_{j=1}^{n} Q_{ij}}$$

where in:

1) $i = 1 \ldots n$, n represents the number of course objective dimensions; $j = 1 \ldots n$, n represents the number of assessment methods;
2) Indicate the achievement degree of the i-th course goal; D_i;
3) Indicate the weight of the j-th assessment method of the i-th course objective; Q_{ij};
4) and respectively represent the actual (average) score and total score of the i-th course objective and j-th assessment method. $A_{ij}B_{ij}$.

Table 4. Calculation and statistical table of the overall achievement degree of the "Engineering Ethics" course objectives of the electronic information major in the 2022–2023 academic year.

Course Objectives Dimension	Assessment method and weight and sample score								Overall goal achievement degree Di
	Course Learning Participation		Platform Online Practice		Study group assignments		Course final exam		
	15%	Sample Average	10%	Sample Average	15%	Sample Average	60%	Sample Average	
Learning attitude	0.6	51	0.15	13.5	0.1	8.6			0.866
Knowledge mastery	0.1	8.5	0.5	45	0.1	8.6	0.2	16	0.779
Teamwork spirit	0.05	4.25			0.5	43			0.855
Comprehension and analysis skills	0.1	8.5	0.1	9	0.1	8.6	0.2	16	0.779
Problem-solving skills	0.05	4.25	0.1	9	0.1	8.6	0.3	24	0.827
Comprehensive practical ability	0.1	8.5	0.15	13.5	0.1	8.6	0.3	24	0.827
∑	1	85	1	90	1	86	1	80	

Now, the "Engineering Ethics" course of 2022 graduate students majoring in electronic information in the 2022–2023 academic year is used as the object to evaluate and analyze the goal achievement degree. The sample size is 68 people. According to the performance data records of students usual learning behaviors and

final exam transcripts in the assessment method, statistical calculations are made according to the course objectives dimensions. The calculation results are shown in **Table 4**.

According to the requirements of the syllabus, the teachers of the curriculum group discussed and determined that the expected value of the achievement degree of ideological and political goals of the "Engineering Ethics" course was set at 0.7 or above, but if it was higher than 0.85, it indicated that there was a high-level deficiency in the course teaching. From the calculation results of the overall achievement degree of sample goals, the achievement degrees of six course goals all exceeded the expectations. Moreover, the achievement degree values of the objectives of "knowledge mastery", "understanding and analysis ability", "problem solving ability" and "comprehensive practice ability" all show that the teaching quality of the course is good and high-order, which are 0.779, 0.779, 0.827 and 0.827 respectively. Overall, the following curriculum teaching objectives show significant outputs:

First, students professional learning enthusiasm and attitude have improved significantly. The implementation of the ideological and political teaching concept of goal-oriented curriculum and the diversification of assessment forms have changed the traditional drawbacks of passing the exam solely by surprise and rote memorization before the exam, mobilized students' initiative and participation in learning, and improved the "head-up rate" of classroom teaching. At the same time, the student-centered position is reflected in teaching, and the teaching method that is in line with young students' habit of online learning on mobile phones is adopted, and the combination of online and offline is implemented, which improves students' interest in learning. In addition, the free combination of group learning mode exercises and enhances students' collaborative communication ability and cultivates students' collective sense of honor.

Second, the number of entries and winning rate of students' discipline competitions have improved significantly. Compared with previous years, the number or number of graduate students majoring in electronic information in 2022 participating in various professional certification examinations and discipline professional skills competitions at all levels has increased significantly. More than 30 people won the first, second and third prizes in various discipline competitions such as the "Blue Bridge Cup" National Software and Information Technology Professional Talent Competition, Big Data and Artificial Intelligence Application Competition, and College Students Algorithm Design and Programming Challenge. More than 10 provincial and school-level graduate innovation and entrepreneurship practice projects and graduate academic innovation projects have been approved. It shows that he has a solid mastery of professional knowledge, strong skills in using knowledge to analyze and solve practical problems, and has been further exercised and cultivated in innovative thinking, establishment of correct scientific and technological ethics and comprehensive practical ability.

Third, graduates' employment competitiveness and post adaptability have been significantly enhanced. The ideological and political education of "Engineering Ethics" course strengthens students' awareness of ethical norms and social responsibility, and improves their professional quality to become future engineering practitioners. A number of outstanding models have emerged in the class, and many

students have won honors such as “outstanding graduates” and national scholarships. The initial employment rate reached 93%, 9 graduates went to colleges and universities for employment, and 26 graduates went to state-owned enterprises, engaged in industries in their professional fields such as information transmission, electronic technology and software technology. Under the fierce employment competition pressure and severe employment situation, they showed strong employment competitiveness. 31.8% of the graduates stayed in their jobs after examination during the internship, and were affirmed and recognized by the leaders of internship enterprises and research institutes, showing strong job competence and good ideological conduct.

From the measurement results of achievement degree, it can also be seen that the achievement degree values of the target items “learning attitude” and “teamwork spirit” are 0.866 and 0.855 respectively, both of which are higher than 0.85, slightly showing that the course is weak and advanced. This may be due to the innovation of teaching content, the interaction of teaching methods and the lack of pertinence of teaching methods, which makes it difficult to fully stimulate the participation of all students, and has not fully met students individualized learning needs and interest inquiry, so it is necessary to reflect on curriculum design.

4.3. Teaching improvement and promotion

Based on the evaluation and analysis results of the achievement degree of curriculum goals, aiming at the problems and shortcomings existing in the diagnosis, this paper puts forward continuous improvement strategies to promote the improvement of teaching quality.

First, in the arrangement of teaching content, we should dig deep into and vigorously develop ideological and political teaching resources closely integrated with curriculum content, highlight the cutting-edge and contemporary nature of content, and expand the depth and breadth of professional content. In the selection of teaching cases, it is necessary to not only reflect the typicality of the case and the truth and significance of the event, but also reflect the representativeness of ethical decision-making dilemmas or ethical events, and the high-end and innovative development of engineering technology in professional fields; It is also necessary to update the case database according to the course teaching theme, create localized cases, adhere to integrity and innovation in view of current events and hot issues in engineering practice, and cultivate students feelings of home and country through discussion and analysis, and enhance their national self-confidence and pride.

Second, in the implementation of teaching methods, more teaching forms are adopted to stimulate students’ participation, interaction and guide students to think and explore. The teaching of theoretical knowledge of curriculum should be carried out by means of intensive lecture of key contents, analysis and discussion of difficult knowledge, and self-study of easy-to-understand contents. The time for classroom teaching and interactive discussion should be reasonably allocated, the assessment mechanism of students’ classroom participation should be clarified and refined, and students’ initiative and enthusiasm in participating in teaching activities should be improved. Strengthen students’ knowledge consolidation and practical training,

inspire their innovative thinking, and cultivate their ability to solve complex engineering ethical problems.

Third, in the use of teaching methods, students at different levels should be taught in accordance with their aptitude. Due to the different pre-majors of students, there are differences in professional foundation, and students with different professional research directions have different interests. On the one hand, according to the requirements of ideological and political teaching objectives of curriculum, innovating teaching methods and forms can make use of online rich resources such as the national ideological and political teaching service platform of curriculum in colleges and universities, the red information platform of "learning to strengthen the country" and the cloud platform of ideological and political courses to promote students independent learning according to their respective needs. On the other hand, strengthening face-to-face targeted guidance after class, such as providing relevant professional help and guidance for students who need to participate in discipline competitions, students who apply for or participate in college students' innovation projects, and students who have received professional qualification textual research, can appropriately increase the number of practical training classes to meet students individual development needs.

5. Conclusion

In the context of new engineering construction and the ideological and political development of curricula, this paper explores a novel teaching reform mode that combines the OBE concept with ideological and political education for the "Engineering Ethics" course. Guided by the OBE educational principle of "student-centered, output-oriented, and continuous improvement", combined with biomechanics, the overall practical design of the "Engineering Ethics" course is implemented through various aspects, including teaching objectives, teaching content, teaching models, and teaching methods. A multi-evaluation mechanism is constructed, combining process assessment with result evaluation and involving multiple stakeholders. Feedback from teaching evaluations indicates that this teaching mode has achieved effective results, demonstrating a high degree of fulfillment of curriculum objectives. It has outlined strategies for further teaching improvement, serves as a demonstration and guidance tool, and holds potential reference value for other curricular reforms, particularly those related to biomechanics.

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