Research on teaching reform and practice of Industrial engineering specialty in the new period

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Abstract: Under the background of the rapid development of information technology and the era of knowledge economy, the teaching of industrial engineering is facing many challenges and opportunities. With the development of industrial engineering specialty and the increase of its application, the traditional teaching methods have been difficult to meet the knowledge and skills required by students in practice. Therefore, the research of teaching reform and practice of industrial engineering specialty becomes very important. The purpose of this paper is to explore and analyze the current situation and existing problems of the teaching reform and practice of industrial engineering major in the new era, and then put forward the corresponding improvement strategies and methods.

Key words: Industrial engineering; Teaching reform; Teaching practice

1. Present situation of teaching reform of Industrial engineering specialty

1.The traditional teaching mode of industrial engineering specialty

As a widely used subject, the teaching mode of industrial engineering has long been the combination of theoretical teaching and practical teaching. The traditional teaching mode is mainly taught by teachers, and students learn by listening to lectures, completing homework and experiments, and designing courses. To a certain extent, this mode can ensure that students master the basic theoretical knowledge, but it has certain limitations in cultivating students' practical ability, innovation ability and teamwork ability.

2.New challenges facing industrial engineering education

(1) Technological development

The development of new industrial technologies such as artificial intelligence (AI), Internet of Things (IoT), big data, etc., is placing new demands on the teaching of industrial engineering majors. First of all, the emergence of these new technologies means that industrial engineers need to master entirely new skills. For example, they need to understand and be able to apply AI and machine learning applications in industrial production, such as predictive maintenance, automated quality control, and so on. Secondly, the rapid development of new technologies also requires educators to constantly update curriculum content to keep teaching real-time and relevant. However, this also brings challenges, as educators need to spend more time and resources to learn and adapt to these new technologies.

(2) Social needs

Society's demand for industrial engineering majors is changing. With the development of the economy and the progress of society, industrial engineers need not only to possess deep professional knowledge, but also to have innovative thinking and cross-disciplinary skills. For example, they need to be capable of design thinking in order to easily understand and solve complex industrial problems. In addition, they will need to have good communication and teamwork skills to work easily in an interdisciplinary environment. This requires industrial engineering education to pay attention not only to the cultivation of professional skills, but also to the improvement of comprehensive quality.

(3) Educational environment

The rise of online education poses new challenges to the way of education and the use of educational resources. The traditional face-to-face teaching method is being replaced by online teaching, which requires educators to master new teaching skills and tools, such as the use of online teaching platform and the design of online courses. In addition, online education also provides students with more learning resources, such as MOOCs (Massive Open Online Courses), open educational resources and so on. However, it also brings challenges, such as how to make effective use of these resources and how to guarantee the quality of online teaching. In general, new technologies, social needs and changes in the educational environment all bring new challenges to industrial engineering education. But these challenges also provide new opportunities for industrial engineering education, such as improving teaching effectiveness through the use of new technologies, and satisfying social needs

2. The important direction of industrial engineering teaching reform

In the new era, the teaching reform and practice research of industrial engineering major is an important issue in the field of education. We need to pay more attention to the innovation of teaching mode and teaching content to meet the needs of the development of the new era while maintaining the core quality of the profession. There are both opportunities and challenges in this process.

1.The role change of college teachers

In the new era, the role of college teachers is undergoing major changes. In the traditional mode of education, teachers are mainly the disseminators of knowledge, but in the new era, teachers need to be the guides, inspirators and partners of students. This requires teachers to continuously improve their professional quality, expand their knowledge horizons, master advanced teaching methods and technologies, so as to better lead students into the ocean of knowledge. At the same time, teachers also need to establish the concept of lifelong learning,

and keep a keen awareness of new knowledge and new technology at any time and a positive learning attitude. Educators should actively participate in relevant professional development activities and seminars to keep abreast of the latest industrial technologies and applications. They can also interact with industry experts to gain experience and insights in practice. In addition, educators can use online courses and resources to improve themselves in order to master new technologies. When updating course content, it should incorporate real cases as much as possible, so that students can better understand and apply new technologies.

2. Innovate teaching methods and means

Innovation of teaching methods and means is also an important direction of industrial engineering teaching reform in the new era. With the development of science and technology, teaching methods and methods are constantly updated. For example, the use of modern teaching methods such as the Internet and multimedia can make teaching activities more vivid, intuitive and effective. In addition, the use of new teaching models such as situational teaching, classroom reversal and case teaching can also improve the teaching effect and stimulate students' learning interest and innovation ability.

3.The importance of practical teaching and practice

Industrial engineering is a highly practical subject, and theoretical knowledge and practical skills need to be combined. The practical characteristics of industrial engineering require us to pay more attention to the combination of theoretical knowledge and practice in the teaching process, and encourage students to learn and master knowledge in practice. Educators should pay attention to the balance of skills in curriculum design, not only to teach professional knowledge, but also to cultivate students' innovative thinking and interdisciplinary skills. Educators can use practical projects, case studies and other means to allow students to learn and exercise these skills in solving practical problems. In addition, educators should also encourage students to work in teams and develop their communication skills. Therefore, we need to establish a sound practical teaching system, increase the construction of practice bases, and increase students' practical learning opportunities, such as experiments, field trips, internships, etc., in order to improve students' practical ability and employment competitiveness. At the same time, colleges and universities should also cooperate closely with enterprises to provide internship opportunities for students, so that they can understand the real situation of industrial engineering in practice.

4. Interdisciplinary cooperation and practical projects

Interdisciplinary cooperation and practical projects are also an important direction of industrial engineering teaching reform. Industrial engineering is a major that covers many disciplines, including mathematics, physics, computer science and so on. Therefore, we need to promote cooperation and practical projects across disciplines so that students can gain comprehensive knowledge and skills in practice. In the current era of knowledge economy, interdisciplinary collaboration has become a trend. Industrial engineering majors should deeply cooperate with other disciplines to jointly carry out interdisciplinary teaching and research projects to meet the needs of society. At the same time, we also need to cultivate students' interdisciplinary thinking and collaboration skills to help them find innovative solutions to complex problems.

To sum up, the teaching reform of industrial engineering in the new era is a major challenge as well as an unprecedented opportunity. While adhering to the professional foundation, we need to actively explore new teaching models and methods, combine traditional teaching methods with modern technology, innovate teaching content, and make teaching more adaptable to the needs of the new era. At the same time, we also need to strengthen cooperation with enterprises and other disciplines to improve students' practical ability and interdisciplinary collaboration, so as to improve the quality of education and produce students who are more innovative and able to cope with future challenges.

3. Practice-based teaching reform strategies

1. Practical demand and application-oriented curriculum design

In the teaching of industrial engineering in the new era, course design should be closely combined with practical needs and application-oriented. The traditional course design mode is often too theoretical, and there is a big gap between it and the actual working environment. Therefore, according to the actual needs of industrial engineering majors, we need to redesign the course to make it more grounded and in line with the development trend of the industry. In the course design process, we can consider inviting professionals from related industries to participate and draw on their practical experience to ensure that the course content matches the practical application. In addition, case teaching and project-oriented teaching methods can be introduced so that students can learn from and master practical skills through practical projects.

2.Innovative mode of practice and practice training

Practice and practical training are important components of the training of industrial engineering students. In order to better cultivate students' practical ability and ability to solve practical problems, innovative practice mode should be introduced into teaching. For example, real internship positions can be provided in cooperation with relevant enterprises so that students can learn and solve practical problems in corporate practice. In addition, students can be organized to participate in competitions, practical projects and other activities to increase their practical experience. Through these innovative practice models, students can better understand the practical application of industrial engineering and cultivate their ability to solve practical problems.

3. The application of information technology in the teaching of industrial engineering

With the rapid development of information technology, its application in the teaching of industrial engineering is becoming more and more important. Educators need to master new teaching techniques and tools to adapt to the needs of online education. They can take

relevant training courses or use online resources to learn on their own. When designing online courses, students' learning habits and needs should be taken into account, and a variety of learning resources and interactive ways should be provided to increase students' participation and learning effectiveness. At the same time, educators also need to explore how to effectively evaluate the effects of online learning and ensure the quality of teaching. Information technology can provide industrial engineering students with more learning resources and tools to help them better learn and practice. For example, virtual LABS and simulation software can be used to simulate real industrial engineering scenarios and allow students to carry out virtual practice. At the same time, Internet resources and online learning platforms can also be used to provide students with more learning materials and communication platforms. Through the application of information technology, the practicability and interactivity of industrial engineering teaching can be strengthened, and the learning effect of students can be improved.

4. Exploring the reform of cooperative education and the combination of industry-university-research

Cooperative education and the combination of industry, university and research is an important way to promote the reform of industrial engineering teaching. Through cooperation with related enterprises and scientific research institutions, theoretical knowledge can be better combined with practical experience, and more targeted teaching resources and practical opportunities can be provided to students. For example, practical training courses can be jointly set up with enterprises to allow students to learn in corporate practice, and through cooperative projects with enterprises, students can gain an in-depth understanding of practical work needs and challenges. In addition, teachers can be encouraged to carry out cooperative research with enterprises and scientific research institutions to promote the exchange and integration of theory and practice. Through cooperative education and the combination of industry-university-research, the teaching quality of industrial engineering majors and the comprehensive ability of students can be improved.

Conclusion

With the rapid development and change in the new period, the research on the teaching reform and practice of industrial engineering specialty has become increasingly important. Education departments and academia have been exploring how to better adapt to the needs and challenges of the current society in order to cultivate outstanding industrial engineering professionals with practical ability and innovative thinking. This paper makes an in-depth study of the current status and challenges of the teaching reform of industrial engineering majors. The research shows that the traditional teaching methods have been difficult to meet the needs of students, and the teaching reform of industrial engineering in the new era needs to emphasize the quality and importance of practical links. Through the investigation and analysis of this research, we can see that the teaching reform has become an inevitable trend under the background of the change of current social needs. By strengthening the practice link and drawing on the advanced experience at home and abroad, we can effectively train outstanding industrial engineering professionals with practical ability and innovative thinking to adapt to the development and change of society. However, we should also be aware of the challenges facing the teaching reform and take appropriate measures to overcome them. Only through continuous improvement and perfection can we better adapt to and promote the development of industrial engineering profession.

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