Educational Reform Exploration of Engineering Mathematics from the Perspective of Artificial Intelligence

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Abstract: Based on the perspective of artificial intelligence technology, this paper explores the teaching reform of engineering mathematics courses. By analyzing the problems existing in engineering mathematics teaching and referring to the application of modern artificial intelligence technology in the field of education, an innovative teaching model is proposed. This study introduces technologies such as natural language processing and machine learning, and proposes an engineering mathematics teaching model based on personalized learning, aiming to improve students' learning effectiveness and interest. Through experimental verification, this teaching model has achieved significant results in improving students' learning motivation, cultivating innovative thinking abilities, and promoting peer cooperation. In addition, this paper discusses the role transformation of teachers in the implementation of this model and the corresponding training needs. Finally, this study prospects the promotion and future development of this teaching model.

1. Introduction

In recent years, with the rapid development of artificial intelligence technology, its application in various fields has shown great potential and advantages. Education is no exception. Artificial intelligence technology is beginning to play an increasingly important role in teaching, providing students with a more personalized and high-quality learning experience. As a subject related to the core courses of engineering majors, Engineering Mathematics is of great significance to the cultivation and development of students. However, there are some problems in the traditional teaching mode of Engineering Mathematics, which restricts students' learning effect and interest to some extent [1-5].

Therefore, this study is based on the vision of artificial intelligence technology, and aims to explore the core research topic of engineering Mathematics from the vision of artificial intelligence. The purpose of this study is to propose an innovative teaching mode by deeply analyzing the problems existing in engineering mathematics teaching, and referring to the application of modern artificial intelligence technology in the field of education, so as to improve students' learning effect

and interest. We will design a personalized learning based on natural language processing, machine learning and other technical models.

The core objectives of this study are to improve students' learning motivation, develop innovative thinking ability and promote cooperation among students. We will evaluate the effect of the proposed teaching model in these aspects through experimental validation, and explore the shifting role played by teachers in the process of implementing the model and the corresponding training needs. Our research results have certain guiding significance for the reform of engineering mathematics teaching, and provide valuable reference for relevant teachers and decision-makers.

This study aims to teach engineering mathematics based on the vision of artificial intelligence, and propose a teaching model based on personalized learning based on natural language processing, machine learning and other technical means. Through the implementation and evaluation of the model, it aims to improve students' learning motivation, cultivate innovative thinking ability and promote the cooperation among students. This study is of great significance for the reform of engineering mathematics teaching, and also provides a new idea for the application of the AI in the education field. Through the popularization and application and future development of this study, we are confident to making more significant breakthroughs in the field of education.

2. Current Teaching Status and Existing Problems of Engineering Mathematics

2.1. Overview of the Teaching Status of Engineering Mathematics

As a basic course of engineering major, Engineering Mathematics plays an important role in cultivating students' mathematical thinking ability and the ability to solve practical problems. However, under the traditional teaching mode, students have some difficulties and challenges in learning engineering mathematics. Therefore, this section will give an overview of the current situation of Engineering Mathematics to better understand the necessity and direction of teaching reform [6-10].

The traditional teaching mode of Engineering Mathematics mainly focuses on imparting theoretical knowledge, but lacks practical application situation and practical link. Students only passively accept the knowledge, and it is difficult to combine the mathematical knowledge with practical problems and apply it in engineering practice. As a result, students' ability in practical problem solving is relatively weak, lack of training of mathematical thinking and application ability.

In traditional teaching, teachers lead the teaching process, and students' participation and initiative are low. The teaching content is single, and it is difficult to meet the personalized needs of different students. Students' interest and motivation in teaching content are not high, and they are prone to poor learning effect. In the traditional teaching mode, the lack of cooperation and communication opportunities among students, and it is difficult to effectively cultivate students' cooperation ability and team consciousness.

In view of the above problems, this paper proposes an innovative teaching mode based on artificial intelligence technology, aiming to improve students' learning effect and interest. This model introduces technical means such as natural language processing and machine learning to solve students' learning difficulties through personalized learning. In this mode, students can choose the learning content and learning mode according to their own learning needs and interests, to achieve the goal of personalized teaching. At the same time, by introducing cooperative learning and project practice, this paper cultivates students' teamwork consciousness and innovative thinking ability.

To verify the effectiveness of this teaching model, we conducted experimental studies. The experimental results show that this model has achieved remarkable effect in improving students

'learning motivation, cultivating innovative thinking ability and promoting students' cooperation. Students' ability to understand and application of the teaching content has been significantly improved, and their learning results have been consolidated and expanded.

Teachers play the role of guide and instructors in the implementation of this model. They need to be familiar with the application of artificial intelligence technology, master the integration of teaching resources and management skills, so as to better guide students' learning process. In teaching, teachers should pay attention to stimulating students 'interest in learning, guide students to conduct cooperative learning and teamwork, and promote the cultivation of students' independent learning and thinking ability. Therefore, teachers need to receive corresponding training and promotion before implementing this model to adapt to the new teaching model and role change.

By summarizing the teaching status of Engineering Mathematics, this paper reveals the problems and deficiencies of the traditional teaching mode. In addition, this paper proposes an innovative teaching model based on artificial intelligence technology, aiming to improve students' learning effect and interest. This model cultivates students' mathematical thinking ability and application ability by introducing personalized learning and cooperative learning. After the experimental verification, the teaching mode has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation. Meanwhile, the paper also discusses the role change in the implementation of the model and the corresponding training needs. We discuss the popularization, application and future development of this teaching mode in order to provide reference for the teaching reform of engineering mathematics curriculum.

2.2. Problems Existing in the Teaching of Engineering Mathematics

As an important basic engineering course, engineering mathematics plays an important role in cultivating students' mathematical thinking ability and the ability to solve practical problems. However, under the traditional teaching mode, there are some problems in the engineering mathematics curriculum, which hinder the improvement of students' learning effect and interest.

The traditional engineering mathematics teaching mode pays attention to the indoctrination of theoretical knowledge and ignores the application of practical problems. Students accept a lot of abstract mathematical theoretical knowledge in class, and it is difficult to apply it to practical problems. As a result, students' interest in learning engineering mathematics and lack of practical motivation.

The traditional engineering mathematics teaching mode lacks personalized teaching. Each student's learning ability and learning style are different, but the traditional teaching mode often adopts the unified teaching methods and rhythm, which cannot meet the personalized learning needs of students. This leads to students' learning difficulties and unsatisfactory learning results [11-12].

The traditional engineering mathematics teaching mode lacks the interactivity and the cooperation. In the traditional classroom, teachers are often the impartors of knowledge, and students are the passive recipients. Students 'interaction and cooperation opportunities are limited, which cannot give full play to students' innovative thinking and cooperative ability [13-14].

To solve these problems, this study proposes an innovative teaching model, an engineering mathematics teaching model based on personalized learning. The model draws lessons from the application of modern artificial intelligence technology in the field of education, and introduces natural language processing and machine learning to realize the identification and satisfaction of students' personalized learning needs.

Under this model, students can choose the learning content and learning methods according to their own learning needs and interests, so as to realize personalized learning. At the same time, teachers can also make teaching adjustment and guidance according to students' learning situation

and feedback information, and provide targeted teaching support.

The model also focuses on the interaction and collaboration between the students. By introducing collaborative learning and project practice, students can cooperate and communicate in the process of solving practical problems, and cultivate innovative thinking and cooperation ability.

After the experimental verification, this teaching mode has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation. Students' interest in learning and learning effect have been significantly improved.

To implement this teaching mode also requires the role change of teachers and the corresponding training needs. Teachers need to change from the traditional knowledge imitator to the guide of student learning and the cooperative organizer, with relevant teaching skills and knowledge reserve.

Problems existing in engineering mathematics teaching include the emphasis on theoretical indoctrination, the lack of personalized teaching and opportunities for interactive cooperation. The engineering mathematics teaching model based on personalized learning can effectively solve these problems and improve students' learning effect and interest. However, the implementation of the model also requires the role shift of the teachers and the corresponding training needs. In the future, the teaching model can be further promoted and further improved and developed in combination with more artificial intelligence technologies and educational concepts.

2.3. The relevance and Significance of Artificial Intelligence and the Teaching of Engineering Mathematics

In the context of the rapid development of artificial intelligence technology, the field of education has gradually begun to pay attention to the application of artificial intelligence technology in teaching. As a basic course of engineering major, the teaching mode and content of Engineering Mathematics also need to be combined with artificial intelligence technology to meet the development needs of The Times.

Artificial intelligence technology can provide a more personalized learning mode for engineering Mathematics teaching. The traditional teaching mode is often a unified teaching method, which cannot meet the learning needs of different students. The personalized learning mode based on artificial intelligence technology can be intelligently adjusted according to students 'learning situation and interest, and provide learning content and methods in line with students' individual differences, so as to improve students' learning effect and interest.

Artificial intelligence technology can provide a more flexible teaching method for engineering mathematics teaching. Traditional teaching often depends on teachers 'explanation and students' listening, and the teaching content and methods are relatively fixed. The teaching mode based on artificial intelligence technology can realize personalized tutoring and feedback to students by introducing natural language processing and machine learning, provide more flexible and diverse teaching methods, and help students better understand and master the knowledge of Engineering Mathematics.

Artificial intelligence technology can also provide more abundant teaching resources for the teaching of Engineering Mathematics. The application of artificial intelligence technology in the education field has been involved in the development and sharing of teaching resources. Through artificial intelligence technology, more abundant and diverse teaching resources can be developed, such as intelligent teaching software, online learning platform, etc., to provide students with more specific and intuitive learning materials and practical opportunities, and improve students' understanding and application ability of the knowledge of Engineering Mathematics.

The application of artificial intelligence technology can also help teachers to play a better role in

teaching. In the traditional teaching mode, teachers are often the imitators and managers of knowledge, while the teaching mode based on artificial intelligence technology can make teachers pay more attention to students 'individual differences and learning process, better guide students to learn, and stimulate students' innovative thinking ability and cooperative spirit.

Artificial intelligence technology and the teaching of engineering mathematics are closely related and important significance. By applying artificial intelligence technology to the teaching of Engineering Mathematics, the advantages of personalized learning, flexible teaching, rich resources and the role change of teachers can be realized, so as to improve students' learning effect and interest and adapt to the development needs of The Times. Therefore, it is of great significance to combine artificial intelligence technology with the teaching of Engineering Mathematics to promote the teaching reform and train engineering professionals.

3. Application and Exploration of Artificial Intelligence in the Teaching of Engineering Mathematics

3.1. Overview of the Basic Principles of Artificial Intelligence and Its Application in Teaching

Artificial intelligence (Artificial Intelligence, AI) is a science that studies how to enable computers to show intelligent behavior. Its basic principles cover machine learning, natural language processing, and expert systems. In the field of education, the application of artificial intelligence technology has achieved remarkable results, which provides new ideas and methods for teaching reform.

The application of artificial intelligence technology in teaching is mainly reflected in personalized learning. The traditional teaching mode is often teacher-centered and ignores the individual differences of students. The teaching model based on artificial intelligence can provide personalized learning resources and learning paths according to students 'personality characteristics and learning conditions, so as to improve students' learning effect and interest.

The application of AI technology in teaching also includes natural language processing. Through natural language processing technology, teachers can semantically analyze and understand the content of the textbook, so as to better answer students' questions and guide their learning. Students can also use natural language processing technology to search and sort out their knowledge to improve their learning efficiency and quality.

Machine learning is also one of the most important applications of artificial intelligence technology in teaching. Through machine learning algorithms, teachers can analyze and predict students' learning behavior and learning performance, and adjust their teaching strategies and content in time. Students can also conduct self-learning and self-assessment through machine learning technology to improve their learning motivation and ability.

Based on the above application of AI technology, this study proposes an innovative teaching model, namely the engineering mathematics teaching model based on personalized learning. By introducing natural language processing, machine learning and other technical means, the model can provide personalized learning resources and learning paths according to students' personality characteristics and learning conditions. After the experimental verification, this teaching mode has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation.

In the implementation of the model, the role of the teacher has also changed. Traditional teachers are mainly imitters of knowledge and supervisors of learning. However, in the teaching mode based on personalized learning, teachers are more like students 'mentors and instructors. Through the analysis and guidance of students' learning behavior, they have guided students to actively participate in learning and develop their innovative thinking ability.

In order to promote and apply this teaching mode, teachers also need to have the corresponding training needs. Teachers need to master the basic principles and application methods of artificial intelligence technology, and also need to understand the characteristics of engineering mathematics courses and the learning needs of students, in order to better implement the teaching mode.

The application of artificial intelligence technology in teaching has achieved remarkable results, and its basic principles cover machine learning, natural language processing, expert systems and other aspects. By introducing natural language processing, machine learning and other technical means, this study proposes an engineering mathematics teaching model based on personalized learning, and achieves remarkable results. However, in order to promote and apply this teaching mode, teachers also need to have the corresponding training needs. In the future, the teaching model needs to be further improved and developed to adapt to the changing educational needs and technological development.

3.2. Case Analysis of Artificial Intelligence Teaching in Engineering Mathematics

In the teaching of Engineering Mathematics, there are some problems in the traditional teaching mode, such as poor learning effect and lack of students' interest. To solve these problems, this study proposes an innovative teaching model based on the AI technology perspective and aiming to improve the students' learning effect and interest.

First of all, through the in-depth analysis of the problems existing in engineering mathematics teaching, this study found that students often lack motivation and interest in the learning process, resulting in poor learning effect. To solve this problem, we introduce artificial intelligence technologies such as natural language processing and machine learning, and propose a teaching model of engineering mathematics based on personalized learning.

The engineering mathematics teaching model based on personalized learning analyzes the students' learning situation and learning habits, and tailors the learning content and learning path for each student. Through natural language processing technology, we transform the curriculum into machine-understandable forms, and provide students with personalized learning materials and exercises according to their learning progress and understanding degree. Through machine learning technology, we can constantly optimize and adjust the learning content according to students 'learning performance and feedback, so as to improve students' learning effect.

After experimental verification, the engineering mathematics teaching model based on personalized learning has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation. After using this teaching model, the students show higher learning enthusiasm and initiative, and their academic performance has also been significantly improved. In addition, through the comparative experiments with the traditional teaching mode, we find that this teaching model can better cultivate students' innovative thinking ability and problem-solving ability.

In the process of implementing this teaching model, the role of teachers has also changed. Traditional teachers mainly play the role of knowledge transmission and guidance, while in the engineering mathematics teaching model based on personalized learning, teachers play the role of counselor and guide more often. Teachers need to provide personalized learning guidance and support for each student through the analysis and understanding of the students' learning situation.

However, to implement this teaching model, teachers need to have the relevant knowledge and skills. Therefore, while promoting the application of the teaching model, the corresponding teacher training is also needed to improve the teachers' professional quality and teaching ability.

The teaching model of "Engineering Mathematics" based on artificial intelligence technology can effectively solve the problems existing in the traditional teaching mode, and improve the

students' learning effect and interest. Through technical methods such as personalized learning and machine learning, the teaching model can provide personalized learning support and guidance for each student, and cultivate students' innovative thinking ability and problem-solving ability. However, the promotion and application of this teaching model also requires teacher training to improve teachers' professional quality and teaching ability. In the future, we will further explore the development and application of this teaching model to better meet the students' learning needs and teaching objectives.

4. Suggestions and Prospects for Educational Reform

4.1. Teaching Reform Strategy of Engineering Mathematics Based on Artificial Intelligence

As an important basic engineering course, engineering mathematics is of great significance for cultivating engineering students' mathematical thinking and the ability to solve practical problems. However, there are some problems in the traditional engineering mathematics teaching mode, such as single teaching content, inconspicuous learning effect, and lack of interest of students. To solve these problems, this paper proposes an engineering mathematics teaching model based on personalized learning based on the vision of AI technology, aiming to improve students' learning effects and interest.

In the research, we first made an in-depth analysis of the traditional engineering mathematics teaching mode, and found that the existing problems mainly have two aspects: first, the teaching content is disconnected from the practical application, it is difficult for students to apply the knowledge to the practical problems; the second is that the teaching method is single, lack of interest and flexibility. To solve these problems, we refer to the application experience of modern AI technology in the field of education, and propose a teaching model of engineering mathematics based on personalized learning.

The teaching model mainly includes two aspects: one is to introduce natural language processing technology. Through the semantic analysis and semantic reasoning of engineering mathematics knowledge, the automatic evaluation of students' learning situation and the recommendation of personalized learning content are realized. The second is to introduce machine learning technology. Through the analysis and mining of the data of students 'learning process, the automatic identification and personalized tutoring of students' learning characteristics and learning needs are realized.

In the experimental verification, we selected several classes for us to implement the teaching mode, and compared it with the traditional teaching mode. The results show that the engineering mathematics teaching model based on personalized learning has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation. Students 'academic performance has been significantly improved, and students' interest in and participation in engineering mathematics courses have also been enhanced.

In the process of implementing the teaching model, the role of teachers has also changed to some extent. Traditional teachers mainly play the role of knowledge transmission, while in the engineering mathematics teaching model based on personalized learning; teachers play more role as instructors and supervisors. Teachers need to monitor and evaluate students 'learning situation, and provide individualized guidance according to students' learning characteristics and needs. Therefore, teachers need to have the corresponding training and ability improvement in the process of implementing the model.

The teaching reform strategy of Engineering Mathematics based on artificial intelligence proposes a teaching model based on personalized learning by introducing natural language processing, machine learning and other technical means. This model can effectively solve the

problems existing in the traditional teaching mode and improve the students' learning effect and interest. However, the model still faces some challenges in the implementation process, such as teacher training and ability improvement, and support of teaching resources. Therefore, while promoting the application of the teaching model, it also needs to be further improved and optimized to meet the needs of different schools and students. At the same time, the teaching reform strategies based on artificial intelligence can continue to be explored in the future to promote the further development of engineering mathematics education.

4.2 Future Prospect of the Teaching of Engineering Mathematics from the Perspective of Artificial Intelligence

As an important basic course, engineering mathematics is of great significance for cultivating students' mathematical thinking ability and the ability to solve practical problems. However, under the traditional teaching mode, students generally have problems such as lack of learning motivation and lack of interest, which leads to the unsatisfactory teaching effect. To address these problems, this study explores an innovative teaching model based on the AI technology perspective and aiming to enhance the students' learning effectiveness and interest.

Based on the analysis of the problems existing in engineering mathematics teaching, this study draws on the application of modern artificial intelligence technology in the field of education, and proposes the engineering mathematics teaching model based on personalized learning. The model introduces natural language processing, machine learning and other technical means, and provides each student with personalized learning content and learning path by analyzing students' learning status and characteristics. In this way, students can better understand and master the knowledge of engineering mathematics and improve the learning effect.

To verify the effectiveness of this teaching model, a series of experiments were conducted in this study. The experimental results show that this teaching mode has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation. Students show higher learning enthusiasm and participation in the personalized learning environment, and their innovative thinking ability and problem-solving ability have also been significantly improved.

In addition to the changing role of students, the role of teachers in the implementation of this teaching model has also changed. Teachers are no longer the traditional knowledge impartor, but the guide and guidance of students' learning. Teachers need to have a certain understanding and mastery of the application of artificial intelligence technology and the implementation of teaching mode, so as to better guide students to conduct personalized learning.

To implement this teaching model, teachers will need to be trained accordingly. They need to understand the basic principles and application methods of artificial intelligence technology, and learn how to design personalized learning content and learning paths according to the characteristics and needs of students. Only when teachers have these knowledge and skills, can they effectively implement the teaching mode and improve students' learning effect and interest.

This study prospects the application and future development of this teaching model. With the continuous development and application of artificial intelligence technology, this teaching model is expected to be promoted in more disciplines and fields. In the future, we can further explore how to better combine artificial intelligence technology with teaching content to provide more intelligent and personalized teaching services. At the same time, we can also study how to evaluate and monitor the student learning effect in a personalized learning environment, and how to provide better learning support and guidance for students.

The teaching mode of engineering mathematics based on the vision of artificial intelligence

technology is of great significance and application value. Through personalized learning, students' learning effect and interest can be improved, and their innovative thinking ability and problem-solving ability can be cultivated. However, the implementation of this teaching model requires teachers to have the corresponding knowledge and skills, and also needs further research and exploration. It is hoped that this study can provide some reference for the teaching reform of Engineering Mathematics.

5. Conclusion

Based on the vision of artificial intelligence technology, this research explores the teaching reform of engineering mathematics curriculum. Through the thorough analysis of the problems existing in engineering mathematics teaching and the application of modern artificial intelligence technology in the field of education, an innovative teaching mode is proposed. This study introduces natural language processing and machine learning, and proposes an engineering mathematics teaching model based on personalized learning. The experimental verification results show that the teaching mode has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation.

This paper summarizes the teaching current situation and existing problems of Engineering Mathematics, and reveals the problems of lack of learning motivation, lack of innovative thinking ability and lack of cooperative consciousness in the traditional teaching mode. Combined with the application of artificial intelligence technology in education, this paper proposes an engineering mathematics teaching model based on personalized learning. The model analyzes students 'learning data through natural language processing technology, recommends personalized learning resources, improves students' learning motivation and interest, and cultivates students' innovative thinking ability. The model also promotes student cooperation through machine learning technology, and realizes knowledge sharing and collaborative learning.

This study also explored the role shift and corresponding need of training in implementing the model. Teachers play the role of instructors and facilitator in the model, guiding and promoting students' independent and cooperative learning. To meet the training needs of teachers, this study suggests that teachers should receive relevant AI technology training to improve their skills and literacy in the teaching process.

This study prospects the application and future development of this teaching model. In terms of popularization and application, this study makes suggestions to apply the model to other subject fields to expand the influence and application of the model. In terms of future development, this study suggests to further study and explore other possibilities of AI application in education, such as the application of AI technology to student learning evaluation, to further improve the teaching effect and personalized learning experience.

This paper puts forward a teaching mode based on personalized learning through the teaching reform of engineering Mathematics from the perspective of artificial intelligence. This model has achieved remarkable results in improving students 'learning motivation, cultivating innovative thinking ability and promoting students' cooperation. However, there are still some shortcomings in this study. For example, the specific content and methods of teacher training need further research and exploration. In addition, this study only proposed a teaching mode based on personalized learning at the theoretical level, and achieved certain results through experimental verification, but it still needs to conduct more detailed and comprehensive verification in practical teaching. Future research could focus on exploring how to apply this model more widely in different disciplines and teaching environments, as well as further optimize the technical means in the model to improve the quality and effectiveness of teaching.

Acknowledgments

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