

Research on the Construction of "Machine Learning" Course Based on OBE Concept

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Abstract: This study explores the construction of the "Machine Learning" course based on the concept of OBE (Outcome-based Education). By examining the research background, it is found that the rapid development of the "Machine Learning" field and the increasing demand for applications make it necessary to make appropriate adjustments and updates to the course. This paper aims to clarify the research objectives and reveal the significance of conducting this research. The study utilizes methods and techniques including systematic analysis, questionnaire surveys, and practical research. Through literature review and expert interviews in relevant research areas, this study explores the content, teaching methods, and evaluation methods of the "Machine Learning" course. The research finds that the construction of the "Machine Learning" course based on the concept of OBE can improve students' active learning ability and practical ability. The main conclusions of this study are of significant importance for the long-term development of the "Machine Learning" course and the enhancement of students' core competencies.

Keywords: OBE Concept; Machine Learning; Course Construction; Active Learning Ability; Practical Ability

1. Introduction

In recent years, with the rapid advancement of artificial intelligence and big data, machine learning has emerged as a crucial supporting technology, garnering widespread attention. The education of machine learning courses is now confronted with new challenges and opportunities. However, the majority of traditional machine learning courses currently place excessive emphasis on imparting theoretical knowledge while neglecting the

development of students' practical and active learning abilities [1-4]. To address this issue, this study explores the construction of "machine learning" curriculum based on the concept of Outcome-Based Education (OBE). A review of research background reveals that due to the rapid growth in "machine learning" and increasing demand for its applications, it is essential to appropriately adjust and update course content. The aim of this paper is to elucidate the significance and objectives behind constructing "machine learning" curriculum based on OBE concept, as well as to explore its potential value in machine learning education. Through methods such as system analysis, questionnaire surveys, and practical research techniques, we delve into studying course content, teaching methods, and evaluation strategies for "machine learning". This study holds significance in enhancing students' active learning ability and practical skills through "machine learning" curriculum construction based on OBE concept. By nurturing problem-solving and innovation capabilities among students, it further advances the development of "machine learning" courses while bolstering students' core competencies. Additionally, this paper presents a concrete case in educational reform by exploring the application value of OBE concept. The objective here is to investigate strategies for constructing "machine-learning" curricula using OBE concepts while providing theoretical support for improving and innovating machine-learning education practices. This research aims to drive changes in machine-learning curricula towards promoting holistic student development aligned with future societal needs. On a practical level, it will also contribute towards elevating our country's standards in machine-learning education by training more professionals thereby fostering sustainable development within this field [5-8].

2. Education Model based on OBE Concept

2.1 Introduction to OBE Concept

OBE (Outcome-Based Education) is an educational concept based on student learning outcomes, the core idea of which is that the goal of education should be based on the development and practical application of students' abilities. The OBE concept emphasizes the cultivation of students' learning outcomes and abilities, and focuses on the improvement of students' actual performance and application ability in the learning process [9-10].

The basic principles of OBE philosophy include goal clarity, learner orientation, learning outcome orientation and assessment orientation. First of all, clarity of goals means that the curriculum and teaching process should specify specific learning objectives, and clarify the ability and knowledge level that students should achieve. Secondly, learner orientation means that teaching should be student-centered, pay attention to students' individual differences and needs, and promote students' learning through personalized teaching methods and resources. Thirdly, learning outcome orientation means that teaching should take students' learning outcomes as the core and pay attention to students' actual performance and ability cultivation. Finally, assessment orientation means that teaching evaluation should be based on students' learning outcomes and evaluate students' learning through a variety of assessment means and methods [11-12].

The course construction of "machine learning" based on OBE concept aims to cultivate students' machine learning ability and practical application ability. Through the OBE concept, we can clarify the learning objectives of the course, such as mastering the basic concepts and algorithms of machine learning, and being able to apply machine learning algorithms to solve practical problems. At the same time, we can design corresponding teaching strategies and resources according to the individual differences and needs of students to promote students' learning. In the teaching process, we will pay attention to the actual performance and ability of students, through project practice, case analysis and other ways to cultivate students' practical ability of machine learning and the ability to solve practical problems.

Finally, we will evaluate students' learning outcomes through various assessment means and methods, such as exams, assignments, project reports, etc. [13-15].

The course construction of "machine learning" based on OBE concept aims to cultivate students' machine learning ability and practical application ability. Through clear learning objectives, personalized teaching strategies and resources, practical teaching methods, and diversified assessment methods, we will help students comprehensively improve their machine learning ability and practical application ability, laying a solid foundation for their future learning and employment.

2.2 Application of OBE Concept in Education

The OBE (Outcome-Based Education) philosophy is a learning outcome-based education philosophy that emphasizes the specific abilities and skills that students achieve during the learning process. The application of OBE concept in education can make education pay more attention to the actual ability development of students, and can better meet the needs of society for talents.

In the course construction of "machine learning", we can also use the concept of OBE to cultivate students' machine learning ability, so that students have the ability to master and apply machine learning algorithms. Specifically, we can realize the application of OBE concept in this course through the following aspects.

On the one hand, we need to clarify the learning outcomes and objectives of the "machine learning" course. These learning outcomes should include the basic knowledge of machine learning, the ability to apply algorithms and the ability to solve problems that students should have at the end of the course. By clarifying learning outcomes, students can have clear goals in the learning process and can better assess student learning outcomes.

On the other hand, we need to design appropriate teaching activities and assessment methods. In terms of teaching activities, a variety of teaching methods such as case analysis, practical operation and group discussion can be combined to enable students to learn and apply machine learning algorithms in practical operations. At the same time, the

assessment method should also match the learning outcome, and the project report, experimental results display and personal ability assessment can be used to evaluate the learning outcome of students.

At the same time, in order to stimulate students' learning interest and motivation, we can introduce problem-driven learning methods. By introducing real problems and challenges, students can be more actively involved in learning and develop their problem-solving skills and innovative thinking. At the same time, we can also encourage students to work in teams and communicate to improve their cooperation and communication skills.

We can also combine industry collaborations and practical projects to enable students to better understand the value and significance of machine learning in practical applications. By working with industry, course content can be made more relevant to real needs, and students can be provided with practical opportunities and practical problem solving experience.

The application of OBE concept in the "machine learning" course can make education pay more attention to the actual ability development of students, and can better cultivate students' machine learning ability. By clarifying learning outcomes and objectives, designing appropriate teaching activities and assessments, introducing problem-driven learning methods, and combining with industry collaboration and practical projects, students' learning outcomes and ability development can be effectively improved. Therefore, it is very meaningful and necessary to apply the OBE concept in the course construction of "machine learning".

2.3 Potential Value of OBE Concept in Machine Learning Education

In the current information age, machine learning as a cutting-edge discipline is rapidly advancing. However, traditional educational approaches are struggling to meet the demand for machine learning talent. Therefore, this paper will explore the construction of "machine learning" courses based on the Outcome-Based Education (OBE) concept and analyze its potential value in machine learning education. The OBE concept emphasizes student-centered learning outcomes and focuses on cultivating students' practical and

applied abilities.

In traditional machine learning education, course structures often lean towards theoretical aspects with insufficient emphasis on practical applications. The OBE concept can address this by introducing real-world case studies and project-based practices that enable students to apply theoretical knowledge to solve actual problems. The construction of "machine learning" courses based on the OBE concept should prioritize the development of students' hands-on skills through practical case studies and project-based activities where they can personally tackle real machine-learning challenges, thereby enhancing their practical capabilities. Furthermore, an OBE-based "machine learning" curriculum should also emphasize fostering students' teamwork and innovation skills. Through collaborative work in real-life scenarios and projects, students learn how to cooperate within a team environment while collectively solving problems. This approach enhances their ability to collaborate effectively with others, communicate ideas clearly, and improve their teamwork skills. Project-based practices can also stimulate innovative thinking among students by encouraging them to consider problems from different perspectives and propose creative solutions. Additionally, an OBE-based "machine learning" curriculum should focus on developing comprehensive competencies among students since machine learning encompasses multiple disciplinary areas such as mathematics proficiency, programming skills, and data analysis capabilities. The curriculum design should comprehensively consider these factors by integrating interdisciplinary subjects like mathematics, computer science, and statistics into a cohesive framework, enabling students to gain holistic mastery of relevant knowledge and skill sets.

The construction of "machine learning" courses based on the OBE concept holds significant potential value. By incorporating real-world case studies and project-based practices, it cultivates students' practical skills and teamwork capabilities while emphasizing comprehensive competency development. This approach better meets the demand for machine learning talent and supports the advancement of machine learning education. Therefore, we have reason to believe that the development of

"machine learning" courses based on the OBE concept will become an important direction for machine learning education in the future.

3. The Current State of Machine Learning Courses

3.1 Machine Learning Course Analysis from a Global Perspective

Globally, the subject of machine learning has become an important part of many higher education institutions. This article will analyze the machine learning curriculum from a global perspective and explore its development trends and key features. As an emerging discipline, machine learning has shown a rapid growth trend in the development of the world. Many well-known universities and research institutions have opened relevant machine learning courses, and constantly update the course content to adapt to the needs of The Times. These courses cover all aspects from basic theory to practical application, providing learners with a comprehensive body of knowledge. Around the world, the teaching methods of machine learning courses are also constantly innovating and improving. Traditional classroom teaching has been unable to meet the needs of students, so many educational institutions have adopted new teaching methods such as online learning platforms and virtual laboratories. These new teaching methods can not only provide more flexible learning methods, but also improve students' practical ability and innovative thinking. Machine learning programs across the globe also focus on developing students' teamwork and interdisciplinary skills. Machine learning, as an interdisciplinary discipline, requires students to have a solid foundation in mathematics and computer science, as well as good communication and teamwork skills. As a result, many courses offer opportunities for team projects and interdisciplinary collaboration to develop students' comprehensive literacy. Hands-on teaching of machine learning courses is also an important feature globally. Many courses enable students to apply theoretical knowledge to practical problems through practical projects and laboratory courses. This kind of practical teaching can not only improve students' practical ability, but also enhance their problem-solving ability and innovation ability.

The machine learning curriculum from a global perspective has the characteristics of rapid development, innovative teaching methods, interdisciplinary ability cultivation and practical teaching. These characteristics can not only meet the needs of students, but also provide a good foundation for their career development. With the continuous progress and application of machine learning technology, it is believed that machine learning courses around the world will continue to grow.

3.2 The Situation of Domestic Machine Learning Courses

The development and application of machine learning courses in China have attracted increasing attention. With the rapid development of artificial intelligence technology, machine learning, as one of the core technologies, has been widely concerned and valued. In China's universities, the opening of machine learning courses is also gradually increasing to meet the needs of students for knowledge in this field. The teaching content of domestic machine learning courses mainly includes the basic principles, algorithms and applications of machine learning. Students are exposed to basic concepts of machine learning, such as supervised learning, unsupervised learning, and reinforcement learning. The course also introduces common algorithms for machine learning, such as decision trees, support vector machines, and neural networks. In order to improve students' practical ability, courses usually set up programming practice sessions, so that students can personally practice the writing and debugging of machine learning algorithms. There are various teaching methods of machine learning courses in China, which pay attention to the combination of theory and practice. Teachers will teach theoretical knowledge to let students understand the basic principles and algorithms of machine learning. There will also be practical sessions where students can apply machine learning algorithms to real problems to develop their problem-solving skills. Some universities will also organize students to participate in machine learning competitions or practical projects, providing opportunities to practice and deepen students' understanding of machine learning. Domestic machine learning courses also face some challenges. Due to the rapid updating of knowledge in the field of

machine learning, teaching materials and teaching content need to be updated and adjusted in time to adapt to new technological developments. Machine learning courses require students to have a high mathematical foundation, and some students may have difficulties in the learning process. Therefore, teachers need to provide personalized tutoring and guidance according to the actual situation of students to help them overcome difficulties. In general, the development of domestic machine learning courses has made certain achievements, but there is still room for improvement. In order to further improve the quality of teaching, we propose to strengthen the construction of teachers, provide more practical opportunities, strengthen cooperation with enterprises, and better combine theory and practice. At the same time, it is also necessary to strengthen the guidance and training of students to improve their comprehensive ability and innovative thinking. Only by constantly improving the construction of machine learning courses can we better train outstanding talents to meet the needs of the era of artificial intelligence.

4. "Machine Learning" Course Construction Strategy based on the OBE Concept

4.1 Setting Goals: Setting goals for "Machine Learning" courses based on the OBE Concept

In the process of "machine learning" curriculum construction, it is essential to identify clear course objectives. This section will set the goals of the "machine learning" course Based on the concept of OBE (Outcome Based Education).

4.1.1 Determine the background of the course objectives

In the era of rapid development of information technology, machine learning, as an important artificial intelligence technology, has a wide range of application prospects. In order to train people with theoretical and practical abilities in machine learning, relevant courses and clear goals need to be set.

4.1.2 Course goal setting principles based on OBE concept

The OBE concept emphasizes learners' outcomes and focuses on their comprehensive development in abilities, skills, and knowledge.

When setting objectives for a "Machine Learning" course based on OBE concepts, following principles should be adhered to:

(1). Learner orientation: Curriculum objectives should revolve around learners' needs and development while focusing on their learning outcomes and fostering lifelong learning ability.

(2). Competency-oriented: Curriculum objectives should concentrate on cultivating learners' core abilities including theoretical analysis ability, practical operation ability, and innovative thinking ability.

(3). Application oriented: Course objectives should closely align with practical applications by focusing on developing learners' problem-solving abilities and skills.

4.1.3 Setting goals for "Machine Learning" courses

Based on the above principles, this paper proposes the following "machine learning" course objectives:

(1). Master the basic concepts and principles of machine learning: Learners should have the ability to deeply understand the basic concepts and principles of machine learning, including supervised learning, unsupervised learning, reinforcement learning, etc.

(2). Proficiency in commonly used machine learning algorithms and tools: Learners should have the ability to master commonly used machine learning algorithms and tools, including linear regression, logistic regression, decision trees, support vector machines, neural networks, etc.

(3). Be able to apply machine learning to solve practical problems: Learners should have the ability to apply machine learning algorithms to practical problem solving, including data preprocessing, feature selection, model training and evaluation.

(4). Have the ability of machine learning practice projects: Learners should have the ability to independently complete machine learning practice projects, including problem definition, data collection and cleaning, model design and optimization, etc.

(5). Develop innovative thinking and teamwork skills: Learners should have the ability to develop innovative thinking and teamwork skills, and be able to conduct innovative research and teamwork in the field of machine learning.

4.1.4 Evaluation and feedback mechanism of

curriculum objectives

In order to evaluate whether the learners have achieved the course objectives, it is necessary to establish the corresponding evaluation and feedback mechanism. Assessments can be made in a variety of ways, including classroom tests, lab reports, and project practice evaluations. At the same time, we should also set up a feedback mechanism to timely understand the learning situation and problems of learners, and provide corresponding guidance and support. Through the above course goal setting and the establishment of evaluation and feedback mechanism, the teaching quality and learning effect of "machine learning" course can be effectively improved, and talents with theoretical and practical abilities of machine learning can be cultivated to make contributions to the development of society and industry.

4.2 Content Design: Adjust the "Machine Learning" course content according to the OBE Concept

In the construction of "machine learning" course based on OBE concept, content design is a crucial part. This section will adjust and optimize the content of the "Machine Learning" course according to the OBE concept.

We need to clarify the OBE concept, that is, the concept of student-centered education. In the course content design, we should focus on cultivating students' comprehensive ability and practical ability, rather than just instilling theoretical knowledge. Therefore, in the "machine learning" course, we need to pay attention to the combination of theory and practice, and pay attention to students' practical ability.

We need to adapt the content of the "Machine Learning" course. Traditional "machine learning" courses usually focus on theoretical knowledge of algorithms and models, but ignore the cultivation of practical application and practical ability. In the course design based on OBE concept, we should combine theoretical knowledge with practical application, and pay attention to students' practical operation and problem-solving ability.

In the content design, we can introduce a large number of real cases and practical projects for students to learn and apply machine learning

algorithms and models through practical operations. At the same time, we can also design some practical assignments and projects, so that students can learn autonomously and solve practical problems.

We can also introduce some new contents and fields, such as deep learning, natural language processing, image recognition, etc., to meet the needs and interests of different students. By introducing new content and areas, it can stimulate students' interest in learning and improve their motivation.

In the course content design, we also need to focus on student evaluation and feedback. Through regular assignment and project evaluation, students' learning situation and problems can be understood in time, and targeted adjustment and optimization can be carried out. At the same time, we can also introduce peer evaluation and self-evaluation evaluation, so that students can actively participate in the evaluation and improvement of the course.

The construction of "machine learning" course based on OBE concept needs to pay attention to content design. By combining theoretical knowledge with practical application, focusing on students' practical operation and problem-solving ability, introducing actual cases and practical projects, as well as regular evaluation and feedback, students' learning effect and practical ability can be effectively improved. This is of great significance for cultivating machine learning professionals with comprehensive ability and practical ability.

4.3 Evaluation and Feedback System: Construct the "Machine Learning" Course Evaluation Mechanism based on the OBE Concept

Assessment and feedback system plays a vital role in education and teaching, which can provide strong support and guidance for teachers and students. The purpose of this study is to explore the construction of "machine learning" curriculum evaluation mechanism based on the concept of OBE (Competency-based education).

In order to ensure the effectiveness and accuracy of the evaluation mechanism, we first clearly defined the objectives of the "machine learning" course. By analyzing the course objectives, we identified competency requirements that match the OBE philosophy,

including the ability to understand and apply machine learning algorithms, solve practical problems, etc.

In the process of building the assessment mechanism, we used a variety of assessment methods to comprehensively evaluate student learning outcomes in the "machine learning" course. These include classroom performance evaluation, homework evaluation, project evaluation and exam evaluation. These assessments are designed to measure students' understanding of machine learning algorithms, their ability to apply them, and their ability to solve real-world problems.

In the classroom performance assessment, we take into account students' participation, discussion ability, problem solving ability and other factors to comprehensively assess students' performance in the classroom. Assignment assessment mainly evaluates students' ability to apply machine learning algorithms by evaluating their submitted assignments. Project assessment evaluates students' ability to solve practical problems through independently completed projects. Finally, the examination assessment examines students' theoretical knowledge and application ability through the form of examination.

In addition to the above assessment methods, we also build a feedback system to provide timely assessment results and suggestions to students. The feedback system can not only help students understand their performance in learning, but also guide students to further study and improve.

In conclusion, the construction of "machine learning" course evaluation mechanism based on OBE concept is a complex and important task. Through a variety of assessment methods and effective feedback systems, we can comprehensively assess students' learning outcomes and help them improve their learning outcomes. It is of great significance to promote students' learning motivation and ability.

5. Conclusion

Based on the concept of OBE, this paper discusses and researches the construction of "machine learning" course. Through a review of the research background, we find that the rapid development of the current field of "machine learning" and the increasing application demand have formed an urgent need for appropriate adjustment and update of

the curriculum. This paper clarifies the purpose of the research and reveals the significance of carrying out the research.

From the perspective of research methods, this study adopts the methods and skills of system analysis, questionnaire survey and practical research. Through literature review and expert interviews in related research fields, we explored the content, teaching methods and evaluation methods of "machine learning" course. It is found that the "machine learning" course construction based on OBE concept can improve students' active learning ability and practical ability, which is of great significance for the long-term development of "machine learning" course and the enhancement of students' core ability.

Summarizing the research content and conclusions of this paper, we can draw the following points: First, this study discusses the importance and potential value of "machine learning" curriculum construction based on the OBE concept in detail. Secondly, by analyzing the machine learning courses in the global perspective and the domestic situation, we find that the current "machine learning" courses are facing many problems and challenges. Most importantly, this paper puts forward the course construction strategy of "machine learning" based on OBE concept, including setting goals, adjusting content design and building evaluation and feedback system. These strategies are expected to provide some guidance and reference for the construction of "machine learning" courses.

There are still some shortcomings in this study. In the practical research, due to the limitation of time and resources, this paper fails to carry out more case studies and field investigations. In the questionnaire survey, due to the limitation of sample size, we cannot cover more groups of students and teachers, which may affect the wide applicability of the survey results. Therefore, the future research can further expand the coverage of practice cases and research samples to improve the reliability and extensibility of the research.

In view of the future research direction and practical suggestions, we suggest that the implementation effect of "machine learning" courses based on the OBE concept in different learning environments can be further discussed and studied, and practical work such as teacher training and textbook research and

development can be considered to better promote the cultivation of students' active learning and practical ability. In addition, we also encourage collaborative teaching and interdisciplinary research between "machine learning" courses and other related courses to promote the development and integration of interdisciplinary disciplines.

The research of this paper is of great significance for the construction of "machine learning" course based on OBE concept and the improvement of students' core competence. However, we should also be aware of the limitations of this study and encourage further in-depth research and practice in order to promote the innovation and development of "machine learning" courses and contribute to the cultivation of globally competitive talents.

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