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Reform of Data Analysis Course in the Context of Digital Economy: Innovation and Practice Based on OBE Concep

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Abstract: With the rapid development of the digital economy, , traditional teaching methods in data analysis courses are deemed insufficient. This study, grounded in the Outcome-Based Education (OBE) concept, explores the reform of such courses. Through innovative teaching methods aligned with OBE principles, the study updates course content, adopts inventive teaching approaches, fosters collaboration between academia and industry, and assesses learning outcomes. The findings highlight the significance of OBE-based reform in enhancing students' comprehensive abilities and addressing challenges of the digital economy. Integrating theory and practice, this study provides robust support for data analysis education in the digital economy era, offering valuable insights for future educational reforms.

Keywords: Data analysis; Digital economy; OBE

1. Introduction

The rapid evolution of the digital economy has underscored the vital role of data analysis as a competitive advantage and decision-making tool in contemporary business settings. Consequently, proficiency in data analysis has emerged as a pivotal skill sought after by employers. However, traditional teaching methods in "Data Analysis" courses at universities face various challenges, including inadequate course structures, a disconnect between theory and practice, reliance on singular software tools, and a lack of practical platforms. These challenges have led to deficiencies in students' practical data analysis skills, impeding their ability to meet the dynamic demands of the digital economy.

In response, the application of the Outcome-Based Education (OBE) concept becomes crucial. OBE shifts the focus of education from the teaching process to learning outcomes, emphasizing clear educational objectives and specific achievements for students[1]. This approach requires educators to define the knowledge and skill framework students should acquire, articulate learning objectives and expected outcomes, and design course content and activities accordingly to ensure students achieve these goals and meet expected outcomes. Additionally, OBE emphasizes fostering students' practical abilities and comprehensive qualities, prioritizing the development of analytical, problem-solving, communication, and teamwork skills to address future challenges[2].

This study aims to explore innovative teaching methods for the data analysis course guided by the OBE concept, aiming to better align with the educational and market demands of the digital economy.

2. The current status and challenges of Data Analysis courses

2.1 The current status

Traditional classroom teaching in data analysis courses suffers from several issues: a gap between theory and practice, a rigid knowledge structure, limited teaching resources, a monotonous instructional approach, and conventional assessment methods. Instruction predominantly revolves around theory dissemination, leaving little room for practical application. Moreover, there's a bias towards a specific data analysis tool, often relying solely on software like Excel and SPSS, neglecting proficiency in other tools and programming languages. However, the digital economy's evolution has introduced a multitude of data analysis tools, such as Python, R, PowerBI, and Tableau, demanding students to master multiple tools to adapt to various analytical needs. Unfortunately, the singular teaching approach hampers students' perspectives, hindering their comprehension of the field's diversity and complexity. Additionally, the absence of suitable practical platforms inhibits students from engaging in real data analysis projects, resulting in a

gap between theoretical knowledge and practical skills application. Consequently, students lack the proficiency to apply theoretical concepts in practical scenarios.

2.2 The Challenges

Integrating theory and practice in data analysis education presents a significant challenge in instructional reform. The current reform efforts face challenges from students, teachers, and institutions.

Student challenges: Diverse backgrounds: Students have varying levels of foundational knowledge, particularly in mathematics and programming skills, which may be lacking in business-oriented students. Balancing instructional content to cater to diverse student needs is essential to provide effective support for all learners.

Teacher challenges: Keeping up with rapid technological advancements in data analysis, including machine learning, artificial intelligence, and big data processing, requires constant updating of course content and teaching methods to ensure curriculum relevance and practicality. Some teachers may lack practical experience and teaching skills in data analysis, hindering effective guidance for students in projects and case analyses. To address these challenges, enhancing teachers' professional competence and establishing partnerships between schools and enterprises to develop courses are crucial tasks in reforming data analysis instruction.

College challenges: Some universities or colleges lack adequate practical platforms and resources, including laboratory equipment, datasets, and case materials. This shortage can impact instructional effectiveness and hinder students' development of practical skills.

3. Data Analysis Course Reform Based on OBE Concept

3.1 Clarifying Learning Objectives

As the digital economy evolves, data analysis technology and methods undergo rapid changes. It's crucial to continuously update data analysis courses to equip students with the skills needed to thrive in this dynamic environment. This involves integrating the latest technologies like machine learning and big data processing while aligning the curriculum with market demands and interdisciplinary subjects such as business, economics, and statistics. By doing so, students can develop comprehensive abilities and innovative thinking, enabling them to apply acquired knowledge directly in practical scenarios [3].

Teaching content should prioritize cutting-edge data analysis technologies like deep learning and reinforcement learning. This involves understanding algorithm principles, application scenarios, and implementation methods to equip students with the latest skills. Incorporating experiments and projects enhances understanding and practical capabilities. Real-life cases from finance, e-commerce, and other sectors help students grasp industry applications and select suitable algorithms. Including updates on cutting-edge technology ensures students remain informed about the latest trends and advancements in data analysis.

3.2 Innovative Teaching Methods

Under the OBE concept, traditional teaching methods, focused on instruction, lack student engagement and creativity. To remedy this, diverse approaches like case-based teaching, problem-oriented learning, and project-driven teaching are crucial. Utilizing digital resources and online platforms, a range of tools and materials, such as online courses, virtual labs, and open educational resources, should be provided. These efforts aim to ignite student interest, accommodate diverse learning needs, and boost engagement and learning outcomes. Ultimately, they promote a deeper understanding of data analysis principles and applications, fostering practical skills development.

In teaching "Statistical Analysis Software - SPSS," diverse methods can enhance classroom engagement and practical learning. Initially, students receive a practical data analysis case, demonstrating SPSS software's real-world applications. Project-driven teaching follows, where students collaborate on various data analysis projects like market research. Detailed guidance aids students in defining analysis objectives and methods, utilizing SPSS software to execute analysis and compile reports. Projects can be managed on a simulated platform, allowing for efficient recording and analysis of project data and student behaviors. Utilizing simulation technology creates a realistic learning environment, promoting critical thinking and problem-solving

3.3 Building Practical Platforms

Practice is the sole criterion for testing truth. Practical platforms in data analysis courses play an important role. Collaborating with enterprises to build such platforms grants students access to real data and projects, fostering engagement in data analysis practices within authentic business environments. This hands-on experience enables students to apply acquired knowledge to real-world scenarios, enhancing their practical skills. Furthermore, internship platforms offer students more job opportunities and career development prospects, facilitating a deeper understanding of industry demands and real work scenarios, ultimately enhancing their employability.

In chapter“Python”,partnering with enterprises can establish a Python practice base equipped with high-performance computers and professional data analysis software, providing students an ideal learning environment. Moreover, inviting Python experts from enterprises as lecturers ensures students receive timely support and guidance. Through collaboration, students are presented with diverse Python practice projects, allowing them to select projects aligned with their interests and expertise. Under teacher supervision, students engage in data processing, model construction, and result analysis using Python, thereby improving their understanding and proficiency in Python's application in data analysis.

3.4 Improving Evaluation System

Under the guidance of OBE, there's a need to establish a comprehensive evaluation system that goes beyond exam scores to assess students' practical abilities and comprehensive qualities effectively. This approach ensures a more holistic evaluation of students' learning outcomes and encourages active engagement in practical activities.

In teaching "Statistical Models-RFM Model," evaluation should include not only traditional written exams but also considerations for classroom participation, case analysis reports, and completion of RFM model application projects. Process evaluation is crucial, where students are tasked with applying the RFM model to practical operations such as customer segmentation and marketing strategy formulation. Observing and recording students' performance in these tasks provide insights into their learning progress and issues, allowing for timely guidance and feedback.

Additionally, introducing evaluation by entrepreneurship mentors is beneficial. Collaboration with enterprises enables experienced mentors to participate in evaluating RFM model teaching. They can assess students based on project completion and model application effects, offering specific suggestions and guidance. This evaluation method helps students understand market demands and career directions, enhancing their practical abilities and professional qualities.

4. Conclusion

Reform of data analysis courses necessitates adherence to the Outcome-Based Education (OBE) concept, prioritizing learning outcomes. This entails enhancing course content clarity, diversifying teaching methods, enriching practical platforms, strengthening school-enterprise cooperation, and improving the evaluation system comprehensively. Continuous improvement through reflection, regular assessment of teaching effectiveness, gathering student feedback, and adjusting teaching strategies are vital for enhancing teaching quality and effectiveness. By embracing the OBE concept in teaching innovation, we can better cultivate high-quality data analysis talents capable of meeting the digital economy's demands, thereby contributing significantly to societal development and progress.

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