



Research on the Construction of Practical Teaching Objectives System for Internet of Things Engineering in Application-Oriented Undergraduate Colleges

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Abstract. This article investigates the problem of constructing a practical teaching objective system for the Internet of Things Engineering program in application-oriented undergraduate colleges. Firstly, it analyzes the current problems and commonalities of the practical teaching objective system, and proposes countermeasures such as clarifying practical teaching objectives, cultivating four-dimensional abilities, deepening the reform of practical teaching, innovating practical teaching modes, and strengthening school-enterprise cooperation. Secondly, it introduces the types and characteristics of practical teaching modes, and proposes corresponding practical teaching modes based on the characteristics of the Internet of Things Engineering program. Finally, it summarizes the main content and contribution of this article, and points out further research and exploration issues that need to be addressed.

Keywords: Application-oriented undergraduate colleges, Internet of Things Engineering program, Practical teaching objectives, System construction.

1 Introduction

1.1 A Subsection Sample

With the rapid development of China's economy, people's living standards have continuously improved, and there is an increasing demand for health and quality of life. At the same time, with the arrival of an aging society, health management and elderly care issues are increasingly prominent[1]. In this situation, the development prospects of the large health industry in China are very broad. The intervention of new technologies such as the Internet of Things(IoT) provides new opportunities for the transformation and development of the large health industry[2]. The involvement of technologies such as the IoT has comprehensively enhanced the intelligent level of diagnosis and treatment[3]. It is increasingly urgent and important to use the IoT technology to solve major problems faced by "health management, medical drugs, rehabilitation intelligence, and elderly care".2020, General Secretary Xi pointed out "higher-quality personnel education needs to be oriented to people's health and life." In the context of the COVID-19

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H. Li and Z. Nie (eds.), *Proceedings of the 2023 2nd International Conference on Sport Science, Education and Social Development (SSESD 2023)*, Advances in Social Science, Education and Humanities Research 781, https://doi.org/10.2991/978-2-38476-122-7_32

epidemic prevention and control, the education mode of new medicine and engineering faces major challenges, and "medical-engineering integration" is the main path for colleges and universities to adjust the professional structure of the big health industry[4-5].

2 Constitution and Principles of the Practical Teaching Objective System for the IoT Engineering Program

2.1 The Composition of The Target System of Practical Teaching Objectives

Professional Cognitive Ability Objective.

Students need to understand the application and role of IoT technology in the medical field, and master the basic concepts, principles, and application scenarios of medical IoT. Students need to understand the composition and characteristics of medical IoT systems, as well as their advantages and limitations in the medical field[6]. Additionally, students also need to understand the development trends and future directions of medical IoT.

Comprehensive Design Ability Objective.

Students need to master specialized skills such as building IoT devices, data collection and processing, and APP development, and be able to reasonably select and design the hardware and software of medical IoT systems based on actual requirements, completing system design and development[7]. Students also need to understand the integration and debugging methods of medical IoT systems, as well as how to apply and promote medical IoT technology in the medical field.

Development Innovation Ability Objective.

projects, and be able to propose innovative solutions based on actual application scenarios. Students should also be able to independently complete code writing and testing. Additionally, students need to understand the innovative applications and research and development progress of medical IoT technology, continuously learning and exploring new technologies and applications to provide better services in the medical field.

Engineering Application Ability Objective.

Students need to possess the ability to apply IoT technology to actual engineering projects, understand and solve practical engineering problems, and have engineering practice experience to independently complete the deployment, debugging, and maintenance of medical IoT systems. Students also need to understand the implementation and management methods of medical IoT engineering projects, as well as how to cooperate and communicate with medical institutions and other related organizations.

2.2 Construction Principles of the Practical Teaching Objective System for the IoT Engineering Program

Theory-Practice Integration Principle.

The integration of theoretical knowledge and practical skills is an important principle in the teaching of the IoT Engineering program. Through the combination of theoretical teaching and practical teaching, students can better understand and grasp IoT technology, improve their ability to solve practical problems, and enhance their innovative spirit[8].

Market Demand Principle.

The development of the IoT engineering field is rapidly advancing, and market demand is constantly changing. The teaching system should closely integrate with market demand, focusing on the cultivation of students' employment ability and development ability, enabling them to adapt to the demands of the job market and future development.

Standardization Principle.

The practical teaching objective system for the IoT Engineering program should follow relevant specifications and standards to ensure the stability and reliability of teaching quality. The standardization principle also includes the quality control and evaluation of the teaching system, ensuring the effective implementation of teaching objectives and meeting the comprehensive quality requirements of students[9-10].

3 Problems and Countermeasures Existing in the Construction of the Practical Teaching Objective System for the IoT Engineering Program in Applied Undergraduate Colleges

3.1 Common Issues

Insufficient Practical Training Programs.

In terms of the number of experimental courses, some colleges and universities suffer from various reasons, such as tight curriculum schedules or inadequate experimental equipment, resulting in insufficient experimental courses and insufficient practical training for students. In terms of the quality of experimental courses, some institutions lack depth and challenge, with simple and repetitive experimental content that fails to truly enhance students' practical abilities and innovative spirit. In terms of practical activities, some institutions lack diverse activities such as course design, comprehensive experiments, and graduation projects, preventing students from integrating their knowledge and improving their practical abilities and overall qualities.

Teaching Content Deviates from Actual Needs.

In applied undergraduate colleges, the problem of insufficient practical training in the field of Internet of Things engineering is particularly evident in the integration of medical technology. Due to the particularity and complexity of the medical field, students are required to possess high practical abilities and comprehensive qualities to better adapt to the work requirements in the medical field. Some colleges' practical content is too simple or outdated, resulting in students' inability to grasp the latest medical technologies and applications. Additionally, due to the rapid update of medical equipment, some colleges' medical equipment may be relatively outdated, failing to meet students' learning needs and the demands of the job market. Furthermore, due to the high professionalism and complexity of work in the medical field, some colleges may be unable to provide sufficient practical opportunities.

Insufficient Construction of Practical Teaching Hardware and Software Facilities.

The field of Internet of Things engineering requires interdisciplinary collaboration and requires students to possess comprehensive qualities, including natural science, engineering technology, team cooperation, communication ability, etc. However, some colleges and universities lack comprehensive quality training, resulting in students' difficulty in adapting to complex working environments. This highlights problems such as inadequate knowledge of natural science and engineering technology, insufficient team cooperation abilities, and weak communication abilities.

3.2 Strategies for Building the Practical Teaching Objective System for the IoT Engineering Program

Clear Practical Teaching Objectives and Focus on "Four-Dimensional" Ability Training.

Clarifying the teaching objectives of practical training and constructing a practice teaching objective system supported by knowledge, abilities, qualities, and values, with four dimensions of ability cultivation: professional cognition, comprehensive design, innovation and development, and engineering application. By offering professional orientation courses and organizing professional lectures, students can deeply understand the characteristics and development prospects of their major. Increasing comprehensive design courses and practical projects enables students to comprehensively apply their knowledge and skills to complete complex Internet of Things system design and development. Offering innovative practical courses and technology competitions encourages students to engage in innovative practices and explorations, improving their competitiveness in the job market. Strengthening cooperation with enterprises, organizing engineering practice projects and internships improves students' engineering application abilities and problem-solving abilities.

Highly Valuing the Integration of Medicine and Engineering, Optimizing Practical Teaching Content.

Highly valuing the integration of medicine and engineering, optimizing practical teaching content by using medical applications as a carrier to integrate and innovate the

experimental content of the IoT engineering major with medical elements, achieving the organic integration of IoT technology and medical applications, forming a "medical IoT" characteristic, improving students' practical abilities and innovative thinking abilities, and adapting to the development of the IoT engineering field and the demand of the job market. Following the principle of "easy to difficult, consolidating and promoting, fully mastering", the four-level practical teaching content is reorganized, including "basic practical projects, comprehensive practical training projects, innovative practical projects, and on-the-job practical projects". Each level of projects adheres to the principle of "thick engineering foundations, integrating medical characteristics, and strengthening practical abilities", using medical applications as a carrier to integrate and innovate the experimental content of medical elements and the IoT engineering major, forming a "medical IoT" characteristic.

Deepening Practical Teaching Reform and Innovating Practical Teaching Models.

In order to improve the effectiveness and quality of practical teaching in the medical field, it is necessary to cultivate students' practical abilities and innovative thinking abilities, and innovate practical teaching models. For example, integrating practical teaching content with actual projects in the medical field, such as the development of medical Internet of Things systems, enables students to participate in the entire process of requirement analysis, design, development, and maintenance, cultivating their practical operation abilities and problem-solving abilities. In addition, introducing real cases from the medical field, such as intelligent medical systems in practical applications, enables students to experience the needs and challenges of actual job positions, improving their adaptability to job positions and problem-solving abilities.

Strengthening School-Enterprise Cooperation and Improving the Construction of Practice Bases.

Strengthening school-enterprise cooperation and improving the construction of practice bases are important measures to enhance the quality of practical teaching for the major of Internet of Things engineering. Cooperating with relevant enterprises to establish specialized practice bases, providing students with places for practice and internships, enables them to get in touch with the development and maintenance process of real Internet of Things projects. Developing practice projects in collaboration with enterprises, such as intelligent healthcare systems, allows students to participate in project development and maintenance, improving their practical operation abilities and problem-solving abilities. Introducing enterprise mentors to provide students with practical guidance and technical support enables them to be exposed to the latest technological applications and development trends, improving their practical application abilities and skill levels. Establishing a maintenance mechanism for practice base equipment ensures the normal operation of equipment and the smooth progress of experiments, enabling students to get in touch with real equipment maintenance and management work, and improving their practical operation abilities and problem-solving abilities. Cooperating with enterprises to carry out scientific research projects allows students to

participate in research and development, improving their innovative thinking and innovation abilities.

4 Conclusions

With the development of the healthcare information technology industry, there is an urgent need to cultivate "medical and engineering integration" talents with cutting-edge technology clinical research and its application. IoT technology is the core technology of smart healthcare, therefore, it is necessary to upgrade and transform the practical teaching model of the IoT engineering major, integrating IoT technology with medical applications, achieving the four-dimensional ability goals of "professional cognition ability, comprehensive design ability, development and innovation ability, and engineering application ability" to meet the social talent demand.

ACKNOWLEDGMENTS

Research Project on Undergraduate Education and teaching Reform in Shandong Province (Key Project), Project No.: Z2021276, Project Name: Study and Practice of the "Four-Dimension, Four-Layers and Four-Stage" Practical Teaching Mode for the Internet of Things Engineering Major Integrated with Medicine and Engineering.

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