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Research on the implementation of project-based teaching of big data technology major under the "1+x" certificate system

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Abstract

The "1+X" certificate system aims to promote the close integration of vocational education and industry needs, and improve the quality and practicality of vocational education. This study takes real projects as the carrier to carry out project-based teaching in the major of big data technology. By completing practical tasks, students can acquire skills and abilities related to a vocational qualification certificate (X certificate), and at the same time complete the knowledge and ability training required by academic education (1 certificate).

Keywords

1+X Certificate System, project-based teaching, big data technology.

1. Introduction

The "1+X" certificate system is an important institutional innovation proposed in the context of China's vocational education reform, aiming to promote the close integration of vocational education and industry needs and improve the quality and practicality of vocational education. "1" is the academic certificate, which fully reflects the quality of talent training in school education; "X" refers to several vocational skill level certificates. Vocational skill level certificates are certificates of the vocational skill level of graduates and members of society and reflect the comprehensive ability required for vocational activities and personal career development [1].

The pilot work of the "1+X" certificate system began in 2019, focusing on serving national needs, and market demands, and improving students' employment capabilities. Starting from vocational skills fields such as construction engineering technology, it has been steadily promoted [2]. The implementation of the "1+X" certificate system has received support and promotion from the Ministry of Education. Through this system, vocational education can better adapt to the needs of economic and social development, and cultivate more high-quality technical and skilled talents that meet social demands.

The project-based teaching under the "1+X" certificate system refers to the teaching method that combines the theoretical knowledge and practical skills in the "1+X" certificate system through the project as the carrier. This approach emphasizes that in real or simulated project situations, students acquire skills and abilities related to a vocational qualification certificate ("X" Certificate) through the completion of practical tasks, while completing the knowledge and ability development required for academic education ("1" Certificate) [3-5].

2. The necessity of practicing project-based teaching

2.1. Meet the practical needs of big data technology majors

The core skills of big data are the collection, storage, processing, analysis, and application of data. The study of these techniques and tools requires not only theoretical knowledge but also

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a lot of practical operation. It is difficult for traditional classroom teaching mode to fully meet students' demand for mastering practical skills, while project-based teaching enables students to master the application of big data technology in practice through actual project operation.

2.2. Meet the requirements of the "1+X" certificate system

The "1+X" certificate system emphasizes that students need not only to obtain academic certificates, but also to master vocational skills in specific fields and obtain corresponding skills certificates. Project-based teaching can effectively integrate these skills into the teaching process, so that students can gradually master these skills in the project and prepare for obtaining the "X" certificate.

2.3. Cultivate students' comprehensive ability

Big data projects often involve the integrated application of multidisciplinary knowledge, such as statistics, computer science, industry knowledge, etc. Through project-based teaching, students can comprehensively apply what they have learned in the process of solving specific problems and cultivate their ability to solve complex problems. In addition, project-based teaching also emphasizes the development of teamwork, time management, and communication skills, which are important qualities needed by big data professionals.

The implementation of project-based teaching for big data majors is not only a necessary measure to adapt to the reform of the education system and the needs of the industry, but also an effective means to improve students' practical ability, comprehensive quality, and employment competitiveness. Through project-based teaching, students can better master the core skills in the field of big data and enhance professional competence.

3. Implementation of project-based teaching under the "1+X" certificate system

3.1. Project selection

Project selection should comply with the following principles:

Relevance: The selected project should be highly relevant to the knowledge system and skill requirements of the "1+X" certificate, covering the main abilities required for students to obtain the certificate.

Practicability: The selected project should be close to the actual industry needs, enabling students to solve real-world problems in the projects and lay a foundation for future employment.

In order to better cultivate vocational skills for students majoring in big data, students can be organized to carry out "1+x" training and certification of professional qualifications such as big data governance. The professional qualification of big data governance requires mastering data acquisition, data preprocessing, data statistical analysis, and data visualization. In the process of project-based teaching, the big data team selected the "AIS Ship big Data Analysis System" reconstructed based on real projects as the teaching project throughout, which covers the functions of data collection, data preprocessing, data statistical analysis, and data visualization.

3.2. Project decomposition

In the teaching process, the project is decomposed into several specific tasks, each task corresponds to one or more skill points. Task design should balance complexity and maneuverability to ensure that students can gradually master the required skills in the process of completing the task.

Taking the Big Data Analysis and Development course as an example, we divided the project into 12 tasks, as shown in Table 1.

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Table 1: Task decomposition of "Big Data Analysis and Development".

Module name	skill
Module 1: Introduction of AIS ship big data analysis system project Module 2: AIS ship big data analysis system project platform preparation	Familiar with the development environment
Module 3: Preparation of Development Language for AIS Ship Big Data Analysis System Project	Familiar with development language
Module 4: AIS data acquisition Module 5: AIS data filtering and cleaning	Data acquisition; Data preprocessing
Module 6: Construction of AIS data warehouse	Data acquisition; Data preprocessing
Module 7: AIS data analysis and statistics	Data analysis
Module 8: Log collection based on AIS system Module 9: Log warehouse based on AIS system	Data acquisition; Data storage
Module 10: Log analysis based on AIS system	Data analysis
Module 11: Display and tracking of ship trajectory	Data visualization
Module 12: Project Summary and Q&A	Project summary

3.3. Teaching implementation

The course is based on the characteristics of big data technology, combined with industry features, relying on real smart shipping projects, simulating work environments, setting up multiple job roles and rotating them, so that students can participate in the project through the entire process, improve the design and research ability, cultivate team spirit, and innovate cooperative learning.

Figure 1: Role rotation.

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During teaching implementation, teachers encourage students to join study groups and assign different roles within each group, such as project design, data analysis, front-end development, back-end development, etc. Students rotate to take on different roles in different tasks. Through role allocation, students can experience different job responsibilities and cultivate various abilities. The role rotation setup is shown in Figure 1.

3.4. Project Presentation and Evaluation

After the project is completed, students report the project results through presentations, Q&A, and other forms. The demonstration content should include the project's design ideas, implementation process, result analysis, as well as personal reflection and gains.

The evaluation combines the process evaluation with the conclusion evaluation. The process evaluation integrates the evaluation of teachers, students, and enterprises effectively and runs through each stage. In each stage, the six core competencies of self-learning, practical application, comprehensive innovation, communication and expression, cooperation and coordination, and independent thinking are used as evaluation indicators. In terms of conclusive evaluation, the "Big Data Governance" 1+X certificate examination system is referenced to conduct final assessments for students.

4. Conclusion

Based on the assessment requirements of the "1+x" vocational certificate and the training needs of job skills, this study chooses the real project "AIS Ship Big Data Analysis System" to run through the curriculum system. Through reasonable curriculum design, effective teaching implementation, and diversified assessments, we aim to cultivate students' basic qualities and vocational abilities for different positions, and enhance their vocational skills and comprehensive qualities.

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References

[1] Guoqing Xu and Mengyao Fu, "1+X" is an Important Innovation of Talent Training Mode of Vocational Education in the Era of Intellectualization. Research in Educational Development, (2019) 39, 21-26.

[2]15 policies introduced to reform vocational education [EB/OL], [2019-05-10], http:// en.moe.gov.cn/ features/PressAndInterview/Pressreleases/202001/t20200117_415851.html.

[3] Jiquan Zou, Research on the Talent Training Mechanism of “Four-party Linkage and Five-chain Coupling” Based on 1 +X Certificate. Adult Education, (2021) 41, 46-52.

[4] Ju Guo and Linping Jia, Analysis on Talent Training Mode of Project-based Teaching Method Integrating "1+X" Certificate System in Higher Vocational Colleges. Journal of Beijing Institute of Economics and Management, (2020) 35, 43-47.

[5] Zhili Zhang and Xiaoming Gu, Teaching Reform of Java-oriented Courses in Vocational Colleges Under 1+X Certificate System. Software Guide, (2022) 21, 221-228.