

# Research on the Development and Application of Program Design Course Resources in Vocational Colleges under the Background of Digital Transformation

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## Abstract

Under the drive of educational digital transformation, vocational colleges face challenges such as the disconnection between traditional teaching resources and industry technical needs, and insufficient practical abilities of students in programming courses. This study, guided by the concept of "integration of production and education," focuses on the development and application of digital resources for programming courses, proposes a resource architecture for programming courses integrating innovative corporate project pools and teaching project platforms, establishes a virtual simulation experiment platform and online training system, and a dynamic learning situation analysis model to achieve personalized learning path recommendations. Through teaching experiments, it has been verified that the application of course resources significantly improves students' participation and project completion, as well as teachers' information-based teaching design capabilities, providing both theoretical and practical references for similar curriculum reforms.

## Keywords

Digital transformation; Higher vocational education; Programming Courses; Resource development.

## 1. Introduction

During the "14th Five-Year Plan" period, China's demand for high-quality technical and skilled talents continues to grow, and the digital transformation of vocational education is imperative. Programming courses are one of the core courses of computer science majors in vocational colleges, which are closely related to students' employability. However, driven by digital transformation, problems such as fragmentation of teaching resources, low utilization rate of students, and insufficient ability of teachers to develop and apply teaching resources have become increasingly prominent.

## 2. The current situation of the development of program course resources in higher vocational colleges

### 2.1. Teaching resources are fragmented

Under the coercion of various teaching resource platforms, the construction of digital teaching resources for programming courses is launched on multiple platforms such as Xuotong platform and vocational education cloud, and teachers need to search and integrate resources across platforms, which is relatively inefficient. The development of teaching resources does not focus on clear teaching goals, and there is a lack of top-level design, resulting in the accumulation of resources rather than organic combination. There is a disconnect between traditional teaching resources and industry technology needs, and the development and application of teaching resources are not fully combined with the requirements of vocational

education talent training, lack of real project case support, and lack of practical project and virtual simulation experiment project support.

### 2.2. The content of teaching resources is intersecting

The traditional resource development is based on the unit of each course, and there is no unified standard, and the resource content will overlap, resulting in a high cost of student screening. Traditional teaching resources lack information-based presentation, which is difficult to adapt to students' personalized learning needs. For example, traditional textbooks cannot achieve dynamic analysis and timely feedback on learners' learning behaviors, and learners often lose the motivation to continue learning after completing learning tasks.

### 2.3. The form of teaching resources is single

Teachers' informatization teaching design ability is insufficient, including the fact that teachers' ability to operate the online teaching platform is slightly insufficient, the form of teaching resources is relatively simple, and innovative resources such as case libraries and virtual experiments are not designed in combination with the characteristics of disciplines, so that different teaching resources cannot be given to students at different levels, meet differentiated learning needs, and are difficult to support the application of curriculum resources.

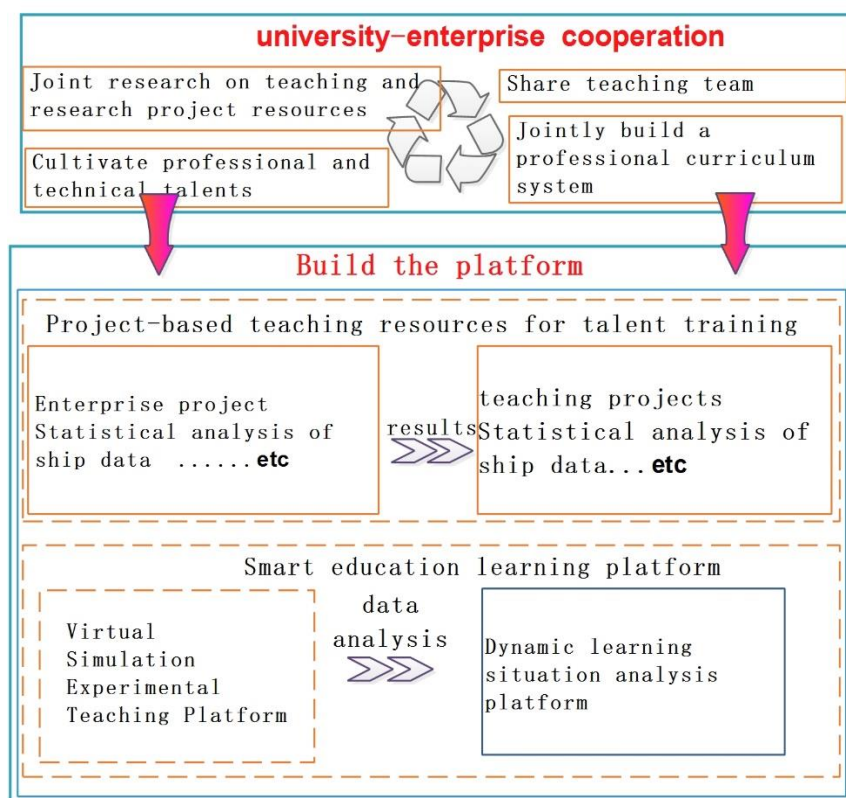


Fig1 Programming course resource structure

## 3. Design of curriculum resource development framework driven by digital transformation

This study focuses on the development and application mode reform of programming curriculum resources, and constructs a programming curriculum resource structure based on "school-enterprise cooperation and platform integration" based on "integration of industry and education", with job ability as the core and work tasks as the carrier, as shown in Fig1, the school-enterprise cooperation to jointly research teaching project resources, share teaching

teams, co-cultivate professional talents, and jointly build a curriculum system, including the construction of a modular and granular teaching project pool and an enterprise project pool. Co-created a curriculum system for the training of professional talents; A smart education learning platform has been jointly built, a virtual simulation experiment platform, an online training system and a dynamic learning situation analysis model have been established to achieve personalized learning path recommendation.

#### **4. Exploration of curriculum application and teaching practice**

Relying on the school-enterprise co-construction teaching resource platform, taking the Python programming course as an example, the design, development and application of online open course resources are carried out, and the course construction features include ideological and political penetration, teaching module customization, multiple selection of technical projects, and personalized path recommendation for students.

##### **4.1. The ideological and political elements are diverse, and the ideological and political curriculum is in the heart**

At the beginning of the course, the industry experts were introduced to build students' pride in the development and changes in the field of big data in China in recent years. At the same time, each task is designed with corresponding ideological and political elements, such as the ten days less in 1582 in the calculation of the lunar calendar, talking about excellence, explaining the multiple choices of life from choice sentences, from personal tax payment to law-abiding, from recursive algorithms to explain divide and conquer from complexity to simplification, from palindromic strings to determine success or failure, online and offline implementation of moral education, moral and technical training, and establish students' correct professional ethics and professional conduct.

##### **4.2. Teaching modules are customized, and technical projects are optional**

The course is designed with modular teaching content covering 5 scenarios, 8 teaching modules, and 28 teaching tasks. At present, four versions of the teaching plan are applied, for software technology majors, students have programming foundation, 36 class hours, therefore, modules 1-4 self-study, module 5 classroom teaching, training items are BMI indicators and alien shooting game projects; For artificial intelligence majors, students have weak programming ability, 56 class hours, classroom teaching modules 1-4, individual income tax calculation for the project; For students majoring in materials engineering and navigation engineering, who have no programming foundation but have strong understanding ability for undergraduates, 64 class hours, classroom teaching modules 1-5, individual income tax + BMI index calculation for the project; For cloud computing students, they have a programming foundation, and 72 class hours, complete 8 modules in 5 major scenarios, and complete at least 4 projects.

##### **4.3. Personalized learning path recommendation for students**

Rich in teaching resources, more teaching project pools developed by school-enterprise cooperation, through offline classroom teaching, online student self-learning content scoring, reasonable recommendation of project modules that students should complete in the phased project assessment, online operation guidance, and assistance to students in project realization, such as in object-oriented programming, basic students realize BMI index calculation, but students who have spare time to learn realize alien shooting game design, and students can choose freely in the final phased defense project. Students' interest and completion in learning are enhanced.

Through long-term construction and improvement, the course resources are rich in variety, the content is high-quality, since the course resources have been launched, students have been

active, actively participated in discussions and other activities, and the number of active users accounts for a high proportion of the number of registered users of the course, taking this semester's cloud class as an example, the participation rate is 99%, and the cumulative interaction is 2663, and the students' project development ability, the coding ability of responding to classroom questions, and the coding ability of the post-class test have been greatly improved. Students have a high evaluation of the course resources, with a score of 5.0 and a positive rating of 100%. The achievement of teaching objectives has been significantly improved, and the professional and technical ability and comprehensive quality of students have been comprehensively improved.

## 5. Summary

This paper analyzes the current situation of the development of program course resources in higher vocational colleges, finds problems, gives solutions to them, reshapes the course teaching objectives, drives the development of teaching resources through courses, realizes school-enterprise cooperation in the research and development of teaching cases and teaching content design, and gives the curriculum resource development framework of the School of Information Engineering of Jiangsu Maritime Vocational and Technical College. In the end, students' participation in course learning and project completion rate have increased significantly. However, due to the rapid iteration of the technical version, in the future, this project will continue to maintain the iterative development of the technical update part of the project cases in digital resources, and apply the design ideas and strategies of resource development to other professional courses.

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