

Research on AIGC-Driven Teaching Reform of Python Financial Fundamentals Course in Higher Vocational Colleges

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Abstract

With the acceleration of digital transformation of vocational education, artificial intelligence generated content (AIGC) technology provides a new opportunity for the reform of higher vocational classroom teaching. Taking the core course "Python Financial Fundamentals" of senior big data and accounting majors as an example, this study discusses in depth the practical path of AIGC-driven course teaching reform in response to the problems of traditional single teaching method, insufficient integration of financial scenarios and programming, and lopsided teaching evaluation that exist in the current teaching. The study proposes: using text, image and video AIGC tools to develop intelligent teaching resources, reduce the burden on teachers and enrich the form of content; constructing an intelligent learning analysis and question-answering system to provide personalized learning support and real-time feedback; relying on intelligent learning platforms to create virtual financial scenarios to support project-based learning and full-process practice; and using AIGC to realize intelligent teaching evaluation based on learning process data and open tasks. The study shows that AIGC can effectively improve teaching quality and students' practical ability. At the same time, the study also points out and proposes strategies to cope with the challenges of ethical risks of the technology, to improve teachers' ability to apply AIGC, and to prevent students' over-dependence. This study provides new ideas for the teaching reform of higher vocational education and the cultivation of compound financial talents.

Keywords

AIGC; Higher Education; Python Financial Fundamentals; Pedagogical Reform.

1. Introduction

At a time of rapid innovation in digital technology, the digital transformation of vocational education has become an inevitable way of adapting to the development of the times[1].2023 In July 2023, the Ministry of Education issued the Circular on Accelerating the Reform of Key Tasks for the Construction and Reform of the Modern Vocational Education System, which proposes that by 2025, about 300 national informatization benchmark schools will have been built and about 1,000 regional schools will have been driven by similar schools, and that the integration of information technology and vocational schools will be promoted[2]. Vocational institutions to promote the deep integration of information technology and vocational institutions. Meanwhile, the Implementation Plan for

Enabling and Enhancing Actions for the Integration of Industry and Education in Vocational Education (2023-2025) emphasizes the use of digital means to solve the problem of disconnect between talent cultivation and industrial development, and to help the integration of industry and education to achieve high-quality development[3].

As a core course for senior big data and accounting majors, "Python Financial Fundamentals" plays a key role in cultivating students' ability to use Python language to solve practical financial problems, and occupies a pivotal position in the professional talent training system[4]. However, the current teaching situation of this course is not optimistic. The teaching method is relatively traditional, mainly based on the teacher's lecture, in a single form, which is difficult to fully take into account the individual differences of students in learning ability, knowledge reserve, etc., and can't effectively meet the diversified and personalized learning needs of students. In the integration of teaching content, financial scenarios and Python programming can not be closely integrated, resulting in students facing the actual financial work scenarios, it is difficult to flexibly apply the programming knowledge they have learned, and the knowledge transfer ability is weak. At the same time, there are obvious defects in the existing teaching evaluation system, which focuses excessively on the theoretical knowledge assessment, and is insufficient to assess students' practical ability, innovative thinking ability and ability to solve complex financial problems, making it difficult to comprehensively and accurately assess the learning effectiveness of the students, which seriously restricts the enhancement of the students' comprehensive quality and the development of their vocational ability[5].

This study focuses on the teaching reform of AIGC-driven higher vocational "Python Financial Fundamentals" course. Theoretically, it analyzes the application logic of AIGC in the field of vocational education, expands the boundaries of related research, and enriches the digital teaching theory of vocational education[6]. In practice, the study explores practical application paths, solves the existing teaching problems of the course, improves the teaching quality and students' learning effect, provides reference for the reform of other courses in higher vocational education, and helps to cultivate more composite financial talents to meet the needs of the times.

2. Overview of AIGC Technology

2.1 Concepts and Principles of AIGC

AIGC, or AI-Generated Content, means Artificial Intelligence Generated Content, which signifies that AI technology is moving from pure perception and understanding to generation and creation. Its core technology architecture relies on deep learning, machine learning and other artificial intelligence algorithms, through the deep mining of massive data and learning, so that the model grasps the characteristics and laws of the data, and then has the ability to generate new content.

Taking generative AI as an example, its working mechanism is based on models such as Generative Adversarial Networks (GAN) and Variational Autocoders (VAE). Generative Adversarial Network consists of a generator and a discriminator, the generator is responsible for generating new data, and the discriminator distinguishes between generated data and real data[7]. The two are continuously optimized in the process of adversarial training, prompting the data generated by the generator to be closer and closer to the real data distribution. The variational self-encoder generates and reconstructs data by constructing a probabilistic model, encoding and decoding the input data. Domestic mainstream generative AI tools such as Byte Jump's Doubao, based on the Lark model, have strong natural language processing capabilities, can accurately understand the user's intent, and provide high-quality text interaction services; Kimi, launched by Dark Side of the Moon, has excellent performance in processing long text, supports input of up to 200,000 Chinese characters, and is widely used in professional scenarios such as translation of academic theses, analysis of legal issues, and other professional scenarios; DeepSeek has a unique advantage in the field of multimodal generation, which can realize the correlation generation of text and images and other types of data. These tools provide users with rich and efficient content generation services by virtue of their advanced technical architecture.

2.2 Current Status of AIGC Application in Education Field

In the field of education, AIGC is setting off a wave of change. Some online education platforms have built intelligent tutoring systems with the help of AIGC, realizing 24-hour real-time Q&A and answering students' doubts in the learning process. In terms of language learning, AIGC-driven speaking practice software can simulate real conversation scenarios, correct students' pronunciation and improve their oral expression ability. Nowadays, AIGC is mainly used in two application modes, namely, content generation and intelligent interaction, in educational scenarios. By generating teaching resources and constructing virtual learning environment, it enriches the form of teaching content; by virtue of intelligent Q&A and learning analysis, it realizes personalized teaching guidance, significantly improves teaching efficiency and learning effect, and injects new vitality into education and teaching[8].

3. Current Teaching Situation Analysis of Python Financial Fundamentals in Vocational Colleges

3.1 Course Objectives and Content

As a core course for senior big data and accounting majors, Python Finance Fundamentals aims to cultivate students to master the basic syntax of Python programming, and to have the ability to use Python to clean, analyze, visualize, and model financial data, so as to adapt to the new needs of financial positions in the context of digital transformation. The knowledge system of the course starts with the basic programming of Python, gradually expands to the application of Pandas, NumPy and other common libraries for financial data analysis, and at the same time integrates financial statement analysis, cost forecasting and other professional scenarios to build a composite knowledge structure of "programming and finance". In terms of skill requirements, it is emphasized that students can independently complete financial data processing projects, from data collection, pre-processing to the visualization of the results of the output, to achieve the in-depth integration of programming technology and financial business.

3.2 Existing Problems in Teaching

In the current teaching practice, the traditional lecture teaching method is still dominant, and it is difficult to meet students' individualized learning needs. There is a significant difference in students' programming foundation, and the uniform teaching progress and content lead to weak students not being able to keep up, while students with a better foundation are difficult to get further improvement. In terms of teaching content, the integration of financial scenarios and Python programming only stays at the theoretical level, and there is a lack of real financial data resources, and the practice cases are old and single, which can't reflect the actual needs of enterprise financial digitization. In addition, the teaching evaluation system overly relies on the final theoretical examination and code running results, ignoring the examination of students' financial logical thinking, problem solving ability and teamwork ability in project practice, which makes it difficult to comprehensively measure the learning effect and the level of development of students' professional ability.

4. Exploring AIGC-Driven Teaching Reform Approaches for Python Financial Fundamentals Curriculum

This architecture flowchart systematically presents the practical path of AIGC technology empowering the teaching of "Python Financial Fundamentals" course, covering a four-level logical architecture of Object Layer, Technology Layer, Data Layer and Application Layer. In the Object Layer, teachers develop intelligent teaching resources through Text AIGC (e.g., DeepSeek), Image AIGC (e.g., StableDiffusion), and Video AIGC (e.g., RunwayML); students drive the Analytics AIGC for teaching and learning; and students drive the Analytics AIGC for learning and code analysis. The Technology Layer AIGC tool generates three types of core data: teaching resource data (courseware/exercises/videos), learning behavior data

(tests/interactions/assignments), and evaluation data (code/project performance) in the Data Layer, as shown in Fig. 1.

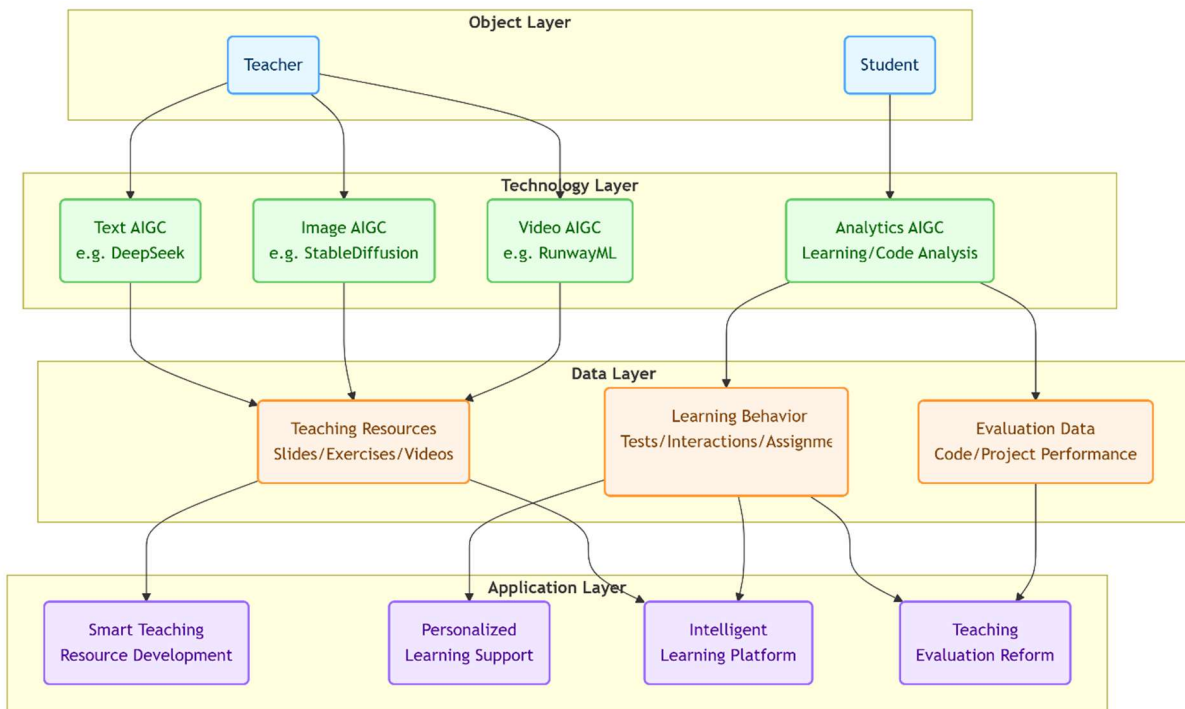


Fig. 1 AIGC empowers the teaching practice path of the course "Python Financial Fundamentals"

4.1 Intelligent Teaching Resources Development

With text-based AIGC tools such as DeepSeek, teachers can automate the generation of courseware and practice questions based on the syllabus and knowledge points. DeepSeek can mimic the way humans create, and quickly produce courseware that covers the basic theory of Python finance, code samples, etc., as well as practice questions with different difficulty gradients, which can effectively reduce the burden of teachers' lesson preparation and improve the efficiency of teaching resources generation. This effectively reduces the burden of teachers in lesson preparation and improves the efficiency of teaching resources generation.

AI drawing tools such as StableDiffusion can be used to create instructional illustrations. When explaining Python data visualization related content, they can generate intuitive chart illustrations to help students better understand the form of data presentation. AI video editing tools such as RunwayML, on the other hand, can be used to create vocational skills tutorial animation, which presents the complex Python financial operation process in the form of vivid animation, making it easy for students to understand and master.

In addition, AIGC technology builds a student model by collecting and analyzing learning data such as students' performance, learning speed, preferences, and error types. Based on this model, the difficulty, depth and presentation of learning content can be dynamically adjusted to achieve personalized teaching. For example, for students with weak foundation, more basic grammar consolidation content is pushed; for students with good mastery, more challenging financial data analysis project cases are provided. Of course, in order to ensure the accuracy and high quality of the generated content, the algorithm needs to be constantly updated and optimized to meet the new teaching needs.

4.2 Personalized Learning Support

AIGC technology can realize the precise planning of learning paths for higher vocational students by building an intelligent learning analysis system. Based on students' programming basic test data,

classroom interaction records, homework completion and other multi-dimensional learning behavior data, machine learning algorithms are used to conduct in-depth analysis and generate personalized ability maps. The system can automatically identify students' strengths and weaknesses in Python syntax mastery, financial data analysis logic, etc., and recommend targeted learning content. For example, for students with weak financial data visualization skills, advanced tutorials for Matplotlib and Seaborn libraries are pushed; for those with weak programming logic, special training in structured program design is provided. This dynamically adjusted learning path design effectively solves the contradiction between the large differences in the foundation of higher vocational students and the uniformity of traditional teaching progress.

Intelligent Q&A and real-time feedback system is the core link of personalized support. Utilizing the domain knowledge base built by AIGC, covering solutions to common problems of Python financial applications, typical error code debugging methods, etc., it can realize 7×24-hour intelligent Q&A service. When students encounter problems during code writing, the system pinpoints the problem through semantic understanding technology and provides step-by-step guidance. For example, for the question of "how to use Pandas for multi-table correlation analysis", the system not only gives function call examples, but also analyzes the application of financial statement consolidation scenarios. In addition, the system can analyze the code submitted by students in real time, automatically detect syntax errors and logic loopholes, and generate suggestions for improvement. This instant feedback mechanism significantly improves students' learning efficiency and problem solving ability, which is in line with the practical nature of higher vocational education.

4.3 Intelligent Learning Platform

The intelligent learning platform relies on AIGC technology to integrate diversified teaching resources and build an immersive learning ecology. Take the National Intelligent Education Public Service Platform as an example, by aggregating massive high-quality educational resources and combining the data processing capability of AIGC, it can deeply analyze the learning behavior, knowledge mastery and other data of the learners of the higher vocational "Fundamentals of Finance in Python" course, and dynamically push personalized learning content based on the results of the analysis, such as directional push Pandas for students with weak financial data cleaning. For example, students who are weak in financial data cleaning are directed to push the Pandas library special reinforcement course.

China University MOOC, Chaoshin Erya, Wisdom Tree and other platforms are also actively exploring the application of AIGC. In the teaching of "Python Financial Fundamentals", virtual financial data analysis scenarios are generated with the help of AIGC to simulate the environment of the real financial data center of the enterprise. Students can carry out the whole process of financial data collection, processing and visualization on the platform, and the system automatically generates operational feedback and optimization suggestions. In addition, these platforms use AIGC to realize the intelligent design of project-based learning tasks and generate step-by-step financial analysis projects according to the ability level of students, such as extracting data from basic financial statements and gradually advancing to the construction of complex financial forecasting models, which effectively improves students' practical ability and professionalism.

4.4 Reform of Teaching Evaluation

AIGC accurately evaluates students' ability to integrate the application of Python programming and financial knowledge by collecting real-time data on their learning process, including code writing efficiency, debugging records, project collaboration performance, etc., and quantitatively analyzing their learning behaviors using natural language processing and machine learning algorithms. For example, the system can automatically detect the correctness of the financial logic in the code, analyze whether the data processing results fit the actual business needs, and generate detailed diagnostic reports. At the same time, AIGC can also generate open evaluation tasks based on the course objectives and vocational competency standards, such as the design of financial data analysis solutions and the optimization of intelligent financial models, etc., to comprehensively evaluate

students in terms of innovative thinking, problem solving ability and other dimensions. This intelligent evaluation not only realizes dynamic monitoring of the learning process and results, but also provides data support for teaching improvement, effectively enhancing the objectivity and comprehensiveness of evaluation.

5. Challenges and Countermeasures for AIGC-Driven Higher Vocational Classroom Teaching Reforms

5.1 Challenges Faced

The AIGC-enabled higher vocational classroom teaching reform faces multi-dimensional challenges. First of all, the security and ethical issues of technology application need to be solved urgently; AIGC model relies on massive data training, and in financial teaching scenarios, there is a risk of leakage of students' personal information and enterprises' simulated financial data; meanwhile, the model-generated content may contain incorrect information, biased views or infringement content, which affects the rigor of teaching and the guidance of values. For example, when generating financial cases, if the training data is biased, it may lead to students acquiring the wrong logic of financial analysis. Secondly, the lack of teachers' AIGC technology application ability has become a key bottleneck. Most of the higher vocational teachers lack experience in the application of AI technology, and it is difficult for them to master AIGC tools to develop teaching resources and design intelligent teaching activities. Some teachers even have cognitive misunderstandings about AIGC technology, and they are overly dependent on it or blindly reject it, which hinders the promotion of teaching reform. In addition, there is a risk of over-reliance on AIGC tools by students. Higher vocational students are generally weak in independent learning ability, and the convenient problem solving and content generation services provided by AIGC may weaken students' independent thinking and practical operation ability, leading to superficial programming logic training and insufficient depth of financial problem analysis, which deviates from the original intention of vocational education to cultivate technical and skilled talents.

5.2 Coping Strategies

In view of the above challenges, it is necessary to build a systematic response strategy. At the level of technical standardization and supervision, institutions should join hands with education authorities and enterprises to formulate AIGC application standards, establish data encryption and content auditing mechanisms, and carry out full-cycle supervision of the teaching resource generation process to ensure data security and content quality. At the same time, the development of education-specific AIGC tools is encouraged to restrict access to sensitive data and undesirable content generation through technical means. In terms of teachers' ability enhancement, special AIGC training has been carried out at different levels and classifications, covering the operation of tools, intelligent teaching design, ethical norms, etc., and helping teachers to accumulate practical experience through workshops, school-enterprise cooperation projects, etc.; an incentive mechanism has been established, and the application of AIGC teaching is included in the appraisal of teachers and the evaluation of their titles, so as to stimulate the motivation of teachers to innovate. To address the problem of over-dependence of students, the teaching process should clarify the boundaries of the use of AIGC tools, and guide students to use it as an auxiliary tool rather than an alternative means; design step-by-step practical tasks to strengthen the core competence training of students in programming and financial analysis; and cultivate students' critical thinking and independent learning ability through case teaching and group collaboration, so that AIGC can truly become a booster rather than an obstacle to enhance learning effectiveness. The AIGC will become a real help rather than a hindrance to enhance learning effectiveness.

6. Conclusion

This study focuses on the teaching reform of "Python Financial Fundamentals" course in higher vocational education empowered by AIGC technology, and systematically explores the practical

paths of intelligent teaching resources development, personalized learning support, intelligent platform construction and teaching evaluation innovation. The study shows that AIGC has effectively solved the dilemmas of traditional teaching, such as single resource, rigid progress, disconnected practice and one-sided evaluation, by automating the generation of customized teaching resources, dynamically planning the learning path, simulating the real financial scenarios, and realizing the process of intelligent evaluation, and has significantly improved the students' programming application ability, financial logical thinking and comprehensive professional literacy. Meanwhile, the study puts forward countermeasures such as strengthening data supervision, training teachers at different levels, and clarifying the boundary of the tools to guarantee the reform in the light of the ethical risks of the technology, the shortcomings of the teachers' ability, and the dependence of the students.

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