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Exploration and Practice of AI-Assisted Teaching Paths for Financial Data Visualization and Analysis

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Abstract: In the digital economy era, there is an urgent demand in the financial field for talents with integrated "technology + business" capabilities. This study focuses on cultivating financial data visualization and analysis capabilities of vocational college finance and economics students, taking Power BI as the core teaching tool and organically integrating AI tools as auxiliary means into the entire teaching process. Focusing on the "Financial Big Data Analysis" classroom, the paper designs specific intervention points of AI tools in key links such as data understanding, code learning, and report writing. Practice through the "profitability diagnosis and analysis" project shows that this model can effectively lower learning thresholds, inspire analytical thinking, and improve the quality of outcomes, thereby addressing students' fear of difficulties, enhancing their comprehensive business analysis capabilities, and providing a practical and referable path for digital teaching reform in similar institutions.

Keywords: Finance and economics education; Data visualization; Power BI; AI-assisted teaching; Project-based learning

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1. Introduction

The global industrial digital transformation has driven the demand for financial talents to shift towards data analysis and value creation. Currently, vocational college finance and economics majors face challenges in cultivating relevant capabilities: teaching of tools such as Power BI mostly focuses on static charts, ignoring interactive analysis and data storytelling; and generative AI technology is not integrated, making it difficult for students to use intelligent tools to improve analysis depth and efficiency. During the teaching process, students with weak foundations are prone to fear of difficulties, and the traditional demonstration-imitation model results in their insufficient ability to independently solve practical financial problems.

To this end, this study focuses on exploring how to organically integrate easily accessible generative AI tools such as Doubao and DeepSeek with Power BI teaching and design a practical and effective teaching model. It aims to use AI as a catalyst to empower the entire teaching process, systematically improve students' financial data visualization and analysis capabilities, and provide operable practical references for the digital

teaching reform of finance and economics majors [1–3].

2. Core concept: AI tools as "Embedded" aids in the Power BI teaching process

To effectively integrate AI tools into Power BI teaching, it is first necessary to clarify their positioning. This study argues that AI should not be regarded as an independent tool parallel to Power BI that requires additional class hours for learning, but rather as an intelligent tutor deeply "embedded" in the standard learning path of Power BI. Its core value lies in serving as a companion learning assistant, providing immediate and low-threshold support when students encounter cognitive obstacles, thinking bottlenecks, or expression difficulties in learning Power BI. This reduces the steepness of the overall learning curve, frees up students' cognitive resources, and allows them to focus on more core business logic construction and higher-order thinking training [4].

Based on this positioning, an auxiliary framework for AI tools in core Power BI teaching stages is constructed (**Table 1**). The framework takes the natural process of Power BI project advancement as the main line, clarifying the specific roles and typical application scenarios of AI in each key link, ensuring the pertinence and effectiveness of integration.

Table 1: Auxiliary positioning and application scenarios of AI tools in each stage of Power BI teaching

Core Power BI Teaching Stages	Auxiliary Position of AI Tools	Key Competence Cultivation Objectives	Typical Application Scenarios
Stage 1: Data Preparation and Understanding	"Data Dictionary and Q&A Machine"	Understand data structure and complete basic data acquisition and cleaning	Input a list of unfamiliar data table fields into AI to request explanations of business meanings; seek help from AI for specific errors in data cleaning (e.g., "column contains unexpected characters") to obtain troubleshooting ideas and possible solutions.
Stage 2: Modeling and DAX Learning	"DAX Logic Interpreter" and "Code Example Library"	Understand data model relationships and master the business logic and writing of core DAX formulas	Paste complex functions into AI and ask it to "explain the calculation logic of this code in plain Chinese"; describe business calculation needs to AI (e.g., "calculate the cumulative sales volume of each product category") to obtain initial DAX code drafts for learning, debugging, and modification.
Stage 3: Visual Analysis and Report Writing	"Analysis Idea Inspirer" and "Report Language Polishing Assistant"	Select appropriate visual objects according to business questions and organize analysis findings into logically rigorous reports	Before analysis, ask AI about business themes (e.g., "how to evaluate the operational efficiency of a retail enterprise from a financial perspective") to obtain key indicators (e.g., inventory turnover rate, accounts receivable turnover days) and analysis dimension suggestions. When writing reports, input scattered data conclusion points into AI and request it to organize them into a structurally clear and linguistically standardized analysis paragraph.

The establishment of this framework makes the application of AI tools no longer arbitrary or ornamental, but purposeful and structured to serve the achievement of core Power BI competence objectives, realizing the resonance between auxiliary tools and mainline teaching.

3. Overall teaching design

To put the above concepts into practice, this study designs an "AI-integrated" teaching path with "a complete financial analysis project" throughout the process. Taking project-based learning (PBL) as the carrier, this path

integrates AI-assisted tasks as a natural part of project advancement.

3.1. Project initiation and data exploration (AI-assisted understanding and framework construction)

At the start of the course, students form groups and receive course tasks. Teachers provide financial statements of case enterprises. Before direct operation, students first conduct "data reconnaissance": input field name lists into AI tools to inquire about their business meanings and report articulation relationships. Through AI-generated explanations, students can quickly establish a business background understanding of the data, lay an analytical foundation, and effectively avoid blindness and confusion when facing raw data [5].

3.2. Data modeling and measure construction (AI-assisted learning and difficulty breaking)

Establishing a correct data model in Power BI is the cornerstone of analysis, and writing DAX measures is the key to realizing business calculation logic, which is also a common difficulty for students. At this stage, the teacher's role transforms from the "only provider of code" to the "explainer and debugger of logic". When students encounter obstacles in creating measures, they are encouraged to describe their Chinese calculation intentions to AI. After obtaining code suggestions, the core task of students is to test, understand the logic line by line, and correct errors in Power BI. This process transforms DAX learning from "grammar memory" to "logic verification and problem-solving", significantly enhancing learning autonomy and intrinsic motivation.

3.3. Visual dashboard design and interactive analysis (AI-assisted thinking and insight discovery)

Students need to present indicators through visual charts and design interactive dashboards. When confused about chart selection or analysis perspectives, AI can act as a "design consultant" to recommend appropriate combinations of visual objects and interactive logic. More importantly, when students discover abnormal data points through interaction, they can immediately ask AI about possible business reasons. The directional hypotheses provided by AI can guide students to conduct targeted, business-driven drill-down analysis, thereby systematically cultivating their in-depth analytical thinking of "discovering problems—proposing hypotheses—verifying and confirming" [6,7].

3.4. Analysis report generation and achievement presentation (AI-assisted expression and outcome enhancement)

The ultimate value of analysis lies in clear communication. To address students' insufficient ability to write professional reports, AI can serve as a "first draft writing partner". Students organize core conclusions, key data, and chart numbers into a list and input them into AI, instructing it to generate the core part of a structurally rigorous and linguistically professional report. However, the key to teaching lies in subsequent "critical revision": students must review, revise, supplement, and deepen the AI-generated content in combination with specific details in the dashboard, the group's unique insights, and learned financial theories. This process not only improves report quality but also trains students' comprehensive professional literacy in examining information, integrating viewpoints, and expressing accurately.

4. Teaching implementation process

To specifically illustrate the above teaching path, the following presents a comprehensive project case implemented in the "Financial Big Data Analysis" course.

4.1. Project background and core tasks

Students obtain five years of financial report data of a "XX Manufacturing Co., Ltd." The core task is to use Power BI to build a dynamic visual analysis dashboard, diagnose the changes in the company's profitability, conduct in-depth analysis of its driving factors and potential risks, and ultimately form a concise analysis report.

4.2. Project implementation process

The project implementation cycle is 4 classes (8 class hours):

(1) First class:

Analysis, planning and data exploration. Each group first conducts brainstorming using AI tools. Input the prompt: "As a financial analyst, to conduct a comprehensive diagnosis of a manufacturing company's profitability, from which core dimensions should I analyze? What key indicators can be calculated under each dimension?" The systematic analysis framework provided by AI effectively helps groups break out of the limitation of "discussing data in isolation" and formulate more professional analysis plans.

(2) Second to third classes:

Tool implementation and in-depth analysis. When creating the complex measure "product line contribution margin ratio", multiple groups encountered difficulties. They described to AI: "I have a 'Product Table' and a 'Sales Detail Table'. The 'Sales Detail Table' contains 'Sales Volume' and 'Variable Costs'. I want to create a measure to calculate (Sales Volume - Variable Costs)/Sales Volume for each product line (from the Product Table)." After obtaining the initial DAX code, they debugged and understood its context conversion logic under the teacher's guidance. During the visualization stage, a group of students found that the company's overall gross profit margin declined in the third quarter of last year. They immediately asked AI about this phenomenon: "In addition to rising raw material prices, what other management reasons may cause a quarterly decline in the gross profit margin of a manufacturing company?" The angles mentioned in AI's reply, such as "insufficient production capacity utilization leading to an increase in unit fixed costs" and "product quality control issues leading to an increase in return rates", inspired the group to further analyze production data and quality data. Finally, the reason was attributed to the low efficiency of a new production line during its initial commissioning in that quarter, demonstrating deeper insights.

(3) Fourth class:

Report integration and presentation. After organizing analysis findings, each group uses AI to assist in generating the first draft of the report. For example, a group of students input the key points: "Overall gross profit margin decreased by 5% in Q3; mainly due to the increase in fixed cost allocation caused by the initial inefficiency of the new product line A; the rising raw material costs of star product B affected part of the profit; it is recommended to focus on improving the efficiency of line A and finding alternative sources of materials for B" into AI, requesting the generation of a fluent report conclusion. After AI generated the text, the group further enriched the data and strengthened the

logic of the text by combining specific percentage data in the dashboard and more granular reasons identified through drill-down analysis, forming the final report [8–10].

4.3. Project implementation effects

This case shows that the embedding of AI tools has successfully shifted the focus of learning from "how to operate software" to "how to think about business problems". AI has played an irreplaceable auxiliary role in three aspects: first, as a "thinking expander", it provides an analysis framework at the beginning of the project to avoid narrow thinking of students; second, as a "difficulty decoder", it provides solutions when encountering technical bottlenecks to help overcome obstacles; third, as an "outcome amplifier", it improves the standardization of written output, enabling students to move from "being able to analyze" to "being good at expressing". The entire process reflects the principle of "human-machine collaboration, with humans as the main body", and students' core analysis, judgment, and decision-making capabilities are always in a dominant position [11].

5. Teaching evaluation and reflection

To comprehensively evaluate the effect of the "Power BI + AI" integrated teaching model, this study designs a diversified evaluation system focusing on processes and comprehensive capabilities.

5.1. Teaching evaluation

The evaluation mainly includes three dimensions: (1) Power BI technical outcomes (50%), assessing the data model, visualization, and interactive functions of the dashboard; (2) AI tool application process (30%), evaluating the accuracy of students' questions, initiative in use, and critical processing capabilities of outputs through submitting "AI usage logs"; (3) Comprehensive business analysis capabilities (20%), evaluating their business insights and logical reasoning level through reports and defenses [12].

5.2. Teaching effectiveness

Firstly, the classroom atmosphere is more active, students' sense of frustration when facing technical difficulties is reduced, and behaviors of active exploration and seeking solutions have significantly increased. Secondly, the quality of final project outcomes has generally improved, with dashboards being more business-oriented, and analysis reports showing obvious progress in structural completeness and linguistic professionalism. Most importantly, students feedback that this teaching method makes them "feel like they have truly solved a practical problem with data", transforming their cognition of financial analysis work from abstract to concrete.

5.3. Challenges and improvements

In practice, this study has also encountered challenges and explored countermeasures:

(1) Challenge 1: Over-reliance on AI and thinking laziness. Some students attempt to directly use AI to generate all DAX code or even analysis reports, lacking independent thinking. Countermeasure: Clearly assign high weights to "AI usage logs" and "personal revision notes" in the evaluation criteria, and carry out special discussions on "the limitations of AI-generated financial analysis" to strengthen students' awareness of critical verification [13–15].

(2) Challenge 2: Uncontrollability of AI output content. AI may provide incorrect code or general business explanations. Countermeasure: Turn this into an important teaching opportunity. Teachers guide students to use AI's incorrect outputs as "debugging and error correction" practice cases, and jointly analyze the causes of errors, thereby achieving a deeper understanding of correct logic. This trains students' necessary information discrimination and verification capabilities in the digital environment.

(3) Challenge 3: New requirements for teachers' capabilities. Teachers' roles need to accelerate the transformation from "one-way imparters" to "learning process designers". Countermeasure: Teaching and research teams need to conduct collective lesson preparation, jointly develop a series of "AI-assisted learning task sheets", share excellent AI prompt cases, and focus on designing classroom teaching links that AI cannot replace to strengthen interpersonal interaction and higher-order thinking collisions.

6. Conclusion and outlook

Facing the urgent requirements of digital transformation for the cultivation of financial talents, this study, based on the actual teaching of vocational colleges, explores a new capability cultivation path with generative AI tools as flexible and intelligent auxiliary lines, focusing on the application scenarios of Power BI in the "Financial Big Data Analysis" course. Practice has proved that this path can effectively give play to AI's unique advantages in lowering initial technical thresholds, providing immediate learning support, inspiring multi-dimensional analysis ideas, and improving the quality of outcome expression, thereby helping students focus their learning on business logic construction and complex problem-solving, and effectively enhancing their comprehensive practical capabilities in financial data visualization and analysis.

This study provides a teaching thinking transformation facing the digital future: educators should actively embrace changes and make good use of intelligent technology as a lever to empower teaching and liberate students' creativity. Looking forward, this model can be continuously deepened in the following aspects: first, develop "AI-assisted learning resource packages" accurately matched with core knowledge modules of Power BI to enhance its popularity; second, explore the establishment of a long-term tracking and evaluation model for the development process of students' "human-machine collaboration" capabilities to more scientifically evaluate the long-term effects of teaching reform; third, extend this integration concept to other professional courses, and gradually build a curriculum system supporting the cultivation of financial digital skills, systematically cultivating compound financial technical talents who understand business, are proficient in tools, and can collaborate for regional economic development.

Disclosure statement

The authors declare no conflict of interest.

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