

# Research on Innovative Teaching Models for the Course of Financial Big Data Analysis Using Python Based on the Concept of Outcome-based Education

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**Abstract:** In response to the heightened demands placed on accounting professionals in the era of big data, and the need to cultivate students' capacities in big data analysis and digital literacy, this study proposes an innovative approach to teaching financial big data analysis courses rooted in the Outcome-based Education (OBE) framework. Addressing prevalent issues in current teaching practices, such as inadequate alignment with real-world business scenarios, students' lack of a strong sense of purpose in their learning, and rigid assessment methods, the research undertakes a thorough optimization of the course structure. By carefully considering institutional context, student requirements, and market dynamics, the study refines course objectives, reconfigures instructional content and resources, and advocates for teaching mode innovation and assessment reform. Resulting from these efforts is a comprehensive teaching model that seamlessly integrates "theoretical exposition, practical business scenario analysis, hands-on Python demonstrations, and task-oriented exercises". Grounded in a pedagogical logic that emphasizes an instructional approach "digging deep into a single case", this model significantly enhances students' proficiency in accounting practices, data analysis techniques, business acumen, and data literacy.

**Keywords:** OBE Philosophy; Accounting; Financial Big Data Analysis; Teaching Model

## 1. Introduction

With the advancement and application of

information technologies such as "cloud computing, big data, artificial intelligence, and internet of things", the digital economy has emerged as a vital force reshaping global resource reallocation and enhancing China's global competitiveness. While the development of the digital economy presents growth opportunities across various industries, it also poses significant challenges for professionals within these sectors [1]. In the face of the rapid evolution of big data technologies, accounting, as an indispensable profession within the economic and social landscape, has garnered significant attention regarding its future direction and development from various segments of society [2]. As educational institutions serve as crucial hubs for talent development, enhancing the cultivation of digitally adept accounting professionals has become an urgent priority.

Driven by emerging technologies such as big data and artificial intelligence, financial analysis is undergoing a transformative evolution towards integration, data-driven sophistication, and intelligent presentation in terms of data sources, technical methodologies, and visualization approaches [2,3]. Financial data within enterprises is transitioning from "small data" towards "big data", characterized by greater granularity, diversity, and multidimensionality. These shifts have redirected the focus of finance and accounting professionals from mere financial data scrutiny towards a holistic view that emphasizes business-finance interplay, leveraging big data insights for forecasting and supporting strategic managerial decisions [4]. The course "Financial Big Data Analysis Using Python" is specifically designed to meet the demands for talents in new technologies, business formats, and emerging professions, aiming to cultivate

students' expertise in financial big data analysis skills, aligning with contemporary industry requisites.

Presently, some scholars have delved into the reform of teaching practices in financial big data analysis courses. Hou Yurong [5] and Li Jianquan [3] have proposed integrating the Student-Centered (SC) teaching philosophy into the instruction of financial big data analysis courses. They have outlined a course reform trajectory that emphasizes refining course objectives, optimizing the curriculum structure, restructuring course modules, expanding case material, and reforming teaching methodologies. This approach aims to enable students not only to effectively utilize extracurricular time but also to actively engage in classroom learning, facilitating a practical application of knowledge acquisition. Additionally, Wang Honghai [6] and others have examined the application of scaffolding teaching methods in the teaching practices of financial big data courses, nurturing students' digital literacy.

At the operational level, to align financial and accounting talent supply with the evolving market demands for professional competencies, individuals must possess not only basic software operational skills but, more crucially, integrate data intelligence technologies with business contexts to empower enterprises in risk management and decision-making processes.

This study focuses on the "Financial Big Data Analysis" course offered at Chongqing University of Science and Technology as a case study. It addresses issues identified in previous teaching practices and proposes and implements reform measures to better meet the new requirements for accounting professionals in the era of big data.

## **2. The Teaching Issues in the Financial Big Data Analysis Course**

The Financial Big Data Analysis course is a core subject in the accounting program at the university, aiming to cultivate students' big data thinking and digital literacy. However, the following three main issues have been identified in the previous course teaching.

### **2.1 Lack of Connection between Teaching Cases and Business Scenarios**

The course content is modular, with distinct

knowledge chapters presented in isolation. The fragmented nature of the learning environment hinders the formation of a cohesive learning experience for students, thereby impeding the development of their overall financial data analysis skills. Additionally, with the ongoing integration of finance and business, the scope of financial data analysis is expanding, necessitating the inclusion of non-financial information in the instructional framework.

### **2.2 Difficulty in Inspiring Students' Sense of Learning Mission**

A significant challenge in the current teaching of "Financial Big Data Analysis" is the lack of student interest and motivation. This can be attributed to the disconnect between theoretical knowledge and practical business scenarios in the teaching process. Students often fail to grasp the relevance of "their learning outcomes" to their future career development, leading to a lack of a sense of purpose and responsibility in their studies.

### **2.3 Misalignment between Assessment Methods and Teaching Objectives**

The focus of the "Financial Big Data Analysis" course should be on developing students' comprehensive analytical and managerial decision-making capabilities through the analysis and application of data. However, the current teaching approach is primarily lecture-based, emphasizing analytical methods and procedures over discussions on analytical logic and practical business applications. As a result, the assessment methods do not fully reflect students' mastery of knowledge and their ability to apply it in real-world scenarios.

To address these issues, a significant reform of the teaching approach is required. This includes enhancing the design of content related to business scenario analysis and practical applications, integrating coherent case studies, and elevating students' professional and practical capabilities.

## **3. Instructional Design of the Financial Big Data Analysis Course based on the Outcomes-based Education Philosophy**

The Outcomes-Based Education (OBE) philosophy, places students at the core, emphasizing outcomes as the primary focus. OBE underscores the importance of aligning

with societal demands for talent, advocating for “a student-centered, outcome-oriented, and continuously improving approach” [7]. This philosophy holds significant guiding significance for driving the development of data-intelligent accounting professionals [8-10]. In line with the OBE educational philosophy, the course team has embarked on research and practice in educational reform, focusing on the restructuring of the teaching model concerning course objectives, course integration, course content, course resources, teaching methods, and assessment mechanisms.

### 3.1 Strengthening University-industry Collaboration to Accurately Target the Course Objectives

The course instructional team has fostered a close partnership with the *Yonyou Seentao*, actively engaging in industry enterprise research and expert interviews to understand the current state, trends, and talent demands within the accounting industry under the backdrop of digitalization. By aligning with the university’s educational positioning, institutional characteristics, student needs, and professional competence requirements, the course objectives have been precisely delineated. The talent development framework is depicted in Figure 1.



**Figure 1. Ability Training Target Frame of Financial Big Data Curriculum**

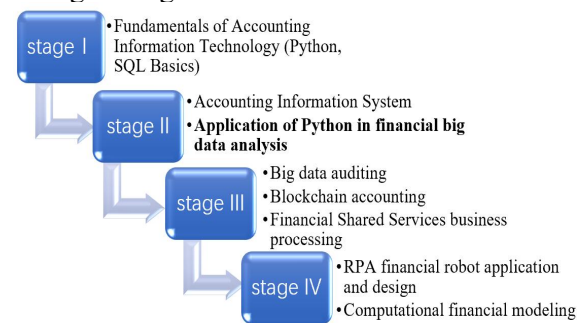
As shown in Figure 1, this course aims to cultivate in students the ability to integrate big data technology with the management concepts of finance and business, empowering them to utilize Python tools for financial data collection, processing, analysis, visual representation, and report writing within business scenarios. Furthermore, the

curriculum seeks to enhance students’ data literacy, innovation mindset, communication skills, and teamwork spirit, fostering the holistic development of their accounting business skills, business acumen, data technical capabilities, and data literacy in a synergistic manner.

### 3.2 Abiding by Cognitive Principles to Strategically Establish Course Connectivity

In pursuit of the skill development objectives in financial big data analysis, it is imperative to adhere to professional talent demands, students’ cognitive patterns, and the logical progression of data analysis. This necessitates a robust foundation in accounting fundamentals, statistics, and financial management, complemented by the utilization of tools such as Python and other programming languages.

Furthermore, the cultivation of skills must harmoniously integrate communication, collaboration, data-centric thinking, and strategic business management proficiency. Drawing on these considerations, the specialized team has meticulously crafted a curriculum system for “Financial Big Data Analysis” (as highlighted in Figure 2), tailored to align more closely with the evolving requirements for accounting professionals in the age of big data.



**Figure 2. Curriculum System of Financial Big Data Analysis Training**

### 3.3 Upholding Outcome-oriented Approaches through the Implementation of a “Dual Reconstruction” Curriculum Strategy

#### 3.3.1 Course content restructuring

The course curriculum framework has been reconfigured into six distinct stages: Financial Big Data Cognition, Fundamental Python Applications, Enterprise Financial Data Acquisition, Financial Analysis, and Crafting

### Financial Analysis Reports.

Guided by the OBE philosophy, the course content is modularly organized to follow a logical progression from business analysis to financial analysis scenarios. This structure entails transitioning from data acquisition and cleansing to data analysis, visual presentation, and the formulation of financial data analysis reports.

In the teaching process, a pedagogical approach encompassing “theoretical exposition, business scenario analysis, hands-on Python demonstrations, and task-based practice” has been adopted. Moreover, through a pedagogical strategy “digging deep into a single case” that gradually progresses from simple to complex, from modular to comprehensive within business scenario analyses, students are better poised to comprehend the learned material within relevant business contexts. This approach is conducive to fostering the evolution of students’ big data analytical thinking and cultivating their holistic application abilities.

#### 3.3.2 Teaching resource reconstruction

In collaboration with *Yonyou Seentao*, the course team has initiated a “University-Enterprise” joint curriculum development endeavor. The course’s teaching resources have been divided into three categories: fundamental resources, practical project resources, and supplementary resources.

Foundational resources encompass essential knowledge and skill points, emphasizing theoretical explanations through resources such as PowerPoint presentations and micro-lectures, facilitating students’ iterative learning. Practical project resources emphasize hands-on experience, integrating cases, scenarios, analytical methods, and tools to address real-world problems. In addition, supplementary resources primarily include data sources from entities like stock exchanges and the national statistics bureau, offering avenues for students to engage in autonomous training and practical exploration, thereby enhancing students’ capacity for self-directed learning.

### 3.4 Placing Students at the Center to Drive Innovations in Teaching Models

#### 3.4.1 The “business scenarios + methods and tools” pedagogical approach

A critical drawback observed in previous course teachings was that while students could

proficiently utilize Python data analysis tools to generate various charts and graphs, they often struggled to discern specific financial issues depicted by these visual representations, let alone propose corresponding strategies for resolution. This challenge primarily stemmed from the separation of data analysis training from business scenarios within the instructional framework, leading students to lack a profound understanding of the underlying logic of data analysis and its application within real-world business contexts. Consequently, the current curriculum emphasizes a “scenario-based” teaching methodology, integrating real-world corporate operational data within case studies to foster an environment conducive to financial data analysis technical training.

Further, emphasis is placed on instructing data analysis methodologies and approaches within business scenarios and problem contexts, aiming to ignite students’ curiosity for data exploration while cultivating their ability to identify critical financial issues through data analysis and devise effective solutions.

#### 3.4.2 The “occupational positions + task-driven” learning methodology

Throughout the course instruction, students are tasked to work in teams and autonomously select industries and enterprises to gather authentic financial data from publicly listed companies using Python tools. They engage in exploring financial data within the chosen industry and company, spanning from macroeconomic environment analysis, industry competitive landscape assessments, enterprise operational evaluations, financial capability appraisals, to crafting financial data analysis reports and engaging in presentation exchanges. By completing a comprehensive financial data analysis task, students undergo a holistic experiential journey mirroring the facets of professional work.

Simultaneously, through discussions and reflections on a series of business tasks, students are encouraged to embrace creativity, fostering independent innovation, teamwork, problem-solving, and analytical skills.

### 3.5 Balancing Process and Outcomes: Implementing Reforms in Educational Assessment

In terms of course assessment, utilizing the online resources platform for the course, an

assessment model combining intelligent process evaluation with participation in academic competitions has been introduced. This approach aims to “motivate” students to actively engage in a variety of blended online and offline instructional activities, including pre-class preparation, interactive “classroom” sessions, in-class experiments, and post-class tasks. Meanwhile, students are encouraged to participate in various academic competitions, with scoring incentives for award-winning participants, effectively stimulates students’ enthusiasm for learning.

This strategy not only nurtures students’ comprehensive skills in big data but also enhances their professional competitiveness as they strive for excellence in their respective career paths.

#### 4. The Effective Implementation of Educational Reform Practices

Through continual enhancements within the curriculum of financial big data analysis, students majoring in accounting at our university have witnessed a remarkable advancement in their abilities to analyze big data and exhibit digital literacy. The intrinsic motivation and proactiveness among students have been elevated, leading to a steady augmentation in their practical proficiency in financial data analysis. Encouraged participation in various financial data analysis and innovation competitions has been observed, resulting in multiple student accolades in competitions at provincial and ministerial levels.

Consequently, the professional competencies and employability of students have consistently surged, with employing organizations praising the graduates for their “excellent professional technical skills and robust practical innovation capabilities”. The satisfaction rate among employing entities towards our graduates stands impressively high at 95%.

#### 5. Conclusion

Grounded in the OBE pedagogical philosophy, this course has undergone a transformative shift in its curriculum design. Departing from traditional modular teaching content, the course now seamlessly integrates business and finance through continuous case studies, establishing a coherent teaching logic known

as “digging deep into a single case”. Adopting a pedagogical framework that combines “theoretical exposition, practical business scenario analysis, hands-on Python demonstrations, and task-oriented exercises”, alongside the utilization of online course resources, this approach effectively bridges theoretical knowledge, methodologies, and practical business scenarios, significantly enhancing students’ professional skills and practical application abilities.

Presently, the instructional design and implementation of this course have yielded commendable overall effects. However, enhancements and refinements are still warranted in areas concerning course assessments, teaching case studies, and practical instruction to further enrich the educational experience and elevate students’ professional capabilities and competitiveness in the job market.

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