Teaching Design and Implementation of "Course of Application Practice of Python in Financial Scenarios" Based on Project Learning Method

Qin Wang, Yu Jia*
College of Applied Science and Technology, Beijing Union University, Beijing, China
**Corresponding Author*

Abstract: With the rapid development of financial technology and the digital economy, higher requirements have been placed on the data awareness, technical application ability, and practical problem-solving ability of financial professionals in universities. As a practice-oriented course for finance majors, "Course of Application Practice of Python in Financial Scenarios" plays an important role in cultivating students' ability to use Python for financial data collection, information parsing, and result storage. In response to the problems of scattered knowledge points, fragmented practical tasks, insufficient integration of financial scenarios, and inadequate evaluation mechanisms in course teaching, this article takes project teaching method as the starting point, and combines the five teaching modules of "Understanding web crawlers, Page data collection, Information data analysis, Web crawler data storage, and Web crawler case practice" to construct a project teaching plan with financial data collection tasks as the main line. The plan integrates the analysis of webpage structure, determination of request methods, selection of data parsing methods, CSV/Excel data storage, as well as case studies of A-share data, financial product information, and enterprise financial data collection into the entire teaching process through the process of "task introduction → project analysis → project implementation → collaborative exploration → achievement display → evaluation feedback → reflection improvement". The results show that project teaching method can help promote the transformation of the course from knowledge teaching to task-driven teaching, from local code training to complete project delivery, and from single technology learning to the integration of financial business understanding and data practice ability. It can provide some reference for the cultivation of applied financial talents and the reform of practical courses in the context of financial technology.

Keywords: Project Learning Method; Python Teaching; Financial Scenarios; Teaching Design; Teaching Implementation

1. Introduction

The deep integration of financial technology, artificial intelligence, and big data technology is systematically reshaping the business form, service model, and job competency structure of the financial industry. This change drives the cultivation of humorous finance professionals to gradually shift from traditional financial theory knowledge to comprehensive training of financial business understanding, data processing ability, and information technology application ability. For students majoring in finance, the ability to transform financial problems into actionable data tasks, and the ability to use programming tools to complete data collection, information analysis, result storage, and preliminary analysis have become important skills foundations for them to adapt to the digital transformation of finance [1].

"Course of Application Practice of Python in Financial Scenarios" is designed for undergraduate students majoring in finance at universities. It is an elective course with strong practicality, comprehensiveness, and applicability. The course content covers some es such as understanding web crawlers, page data collection, information data parsing, web crawler data storage, and web crawler case studies. The aim is to train students through the Python programming language to complete tasks such as network data collection, key information extraction, and data storage, thereby enhancing their ability to solve data collection and analysis problems in real financial scenarios. From the

perspective of course objectives, the course not only requires students to master the basic methods of Python data collection, but also emphasizes their ability to transform financial business needs into program implementation logic, forming a comprehensive literacy that combines knowledge, data awareness, and technical application abilities.

Through visiting nearly 20 universities in Beijing, the teaching practice effect of the course is mainly manifested as: on the one hand, most students majoring in finance have relatively weak programming foundations, and their understanding of code logic, webpage structure, request methods, and data parsing methods is not systematic enough. On the other hand, the teaching process usually revolves around teacher explanations, code demonstrations, and student imitation exercises. Although students can complete partial code runs, they find it difficult to understand the entire process of a complete data collection project, from requirement analysis, target site identification, page requests, data parsing, to result storage. When the course cases are not closely related to real financial business, students are prone to learning confusion of "knowing how to write code, but not knowing where to use it", which in turn affects their learning initiative and knowledge transfer effectiveness.

Therefore, combined the training requirements, teaching content, and characteristics of the course, and based on project teaching method, a progressive project task system of "task introduction → project analysis → project implementation → collaborative exploration → achievement display → evaluation feedback → reflection improvement" is designed, aiming to provide a reference teaching path for the reform of practical courses in finance majors and the cultivation of applied finance talents under the background of financial technology.

2. Analysis of the Current Teaching Situation of the Course

2.1 The Knowledge Content of the Course is Relatively Scattered, Resulting in Insufficient Awareness of Complete Projects among Students

The course revolves around the basic process of "sending requests → parsing data → storing data", covering multiple knowledge points such as Requests library, Get/Post requests, Session and Cookie, Regular expressions, Xpath, BeautifulSoup, Json data parsing, CSV and Excel file storage. These contents have strong logical connections themselves. If explained one by one in the order of chapters, students may easily understand them as independent technical fragments and find it difficult to integrate them into a complete data collection project process. When students are studying the Requests library, they often only focus on whether the request statement can run. When students are learning Xpath or BeautifulSoup, the main focus is on whether the specified fields can be extracted. When students are learning CSV or Excel storage, it is easy to focus on whether the file can be successfully written. From the perspective of teaching effectiveness, students have completed the training of each link, but when faced with a complete financial data collection task, they may still be unclear about how to conduct target site analysis, how to choose request methods, how to determine parsing methods, how to design field structures, and how to form submittable data results. Therefore, the teaching of the course cannot be limited to the training level of a single knowledge point. It should be project to help students form a complete project thinking from requirement identification to outcome delivery.

2.2 Significant Difference in Programming Fundamentals, Resulting in Uneven Participation of Students in Practical Activities

Although the course focuses on practical applications, finance students still need to understand basic syntax of Python, web request principles, data parsing rules, and file storage methods in a relatively short period of time. For students with a good foundation in programming, the code logic, function calls, and debugging process are relatively easy to understand; But for students with weaker foundations, difficulties may arise in basic processes such as variables, loops, lists, dictionaries, library calls, and exception errors, which in turn affect their participation in subsequent tasks such as page requests, information parsing, and result storage. If teachers follow a uniform pace to explain and demonstrate, it is easy for students with good foundations to feel that the task is not challenging enough, and students with weaker foundations to feel frustrated due to not being

able to keep up with the code implementation process. If there is a lack of task stratification, process guidance, and group collaboration mechanisms, classroom practice is prone to the phenomenon of "the strong monopolizing and the weak observing", which is not conducive to the overall improvement of students' abilities.

2.3 Insufficient Integration of Financial Scenarios, Resulting in Disconnect between Students' Technical Learning and Professional Understanding

The core of the course is not simply teaching Python syntax or web crawling techniques, but guiding students to understand the application value of Python in financial data collection and financial information processing. The course cases involve A-share stock data, financial product information, enterprise business information, bank balance sheets, and profit and loss statements, etc., with distinct financial scene characteristics. The practical teaching platform also uses stock bar comment data, wealth management product information of China Merchants Bank, financial industry stock data in A-share, and corporate balance sheet information of Industrial and Commercial Bank of China as typical case resources, providing a foundation for financial scenario-based teaching. If teachers overly emphasize code running and operation steps, students may easily understand the course as "crawling web pages," "writing code," or "completing experiments," and find it difficult to recognize the connection between data collection tasks and financial business problems [2]. For example, collecting stock data is not only to obtain a set of numbers, but also to serve industry comparison, market observation, or investment analysis. Collecting bank financial statement information is not only about webpage parsing training, but also related to students' understanding of the operating conditions and financial information disclosure of financial institutions.

2.4 Practical Training Focuses on Local Operations, Resulting In Insufficient Students' Ability to Deliver Results

Each unit of the course is equipped with corresponding practice tasks, which can help students master basic skills such as page requests, information parsing, and data storage. If practical training mainly revolves around a single knowledge point, although students may be able to complete a function call, field extraction, or file writing task, they may not necessarily have the ability to independently complete a complete project. A relatively complete financial data collection project usually includes multiple stages such as task understanding, target site selection, webpage structure analysis, request method judgment, code writing, field parsing, exception handling, result storage, and result explanation. Improper handling of any link may affect the final data results and project quality. Therefore, the teaching of this course should not only train students to "know how to write code", but also cultivate their project process awareness, problem solving ability, data standardization awareness, and achievement expression ability.

Table 1. The Main Teaching Problems of the "Course of Application Practice of Python in Financial Scenarios"

Main dimensions	Existing issues	Specific manifestations
Knowledge structure	Knowledge points are relatively scattered	The contents of Requests、Xpath、BeautifulSoup、Json、CSV、Excel are distributed in different units, students may easily understand it as isolated technical points, making it difficult to form a complete project thinking
student foundation	Significant differences in programming abilities	The programming foundation of students varies greatly, and some students have difficulties in code understanding, library calling, and error debugging
Scene integration	The financial business attributes are not prominent enough	Students tend to understand the course as simply "writing code" or "crawling web pages", and have insufficient understanding of the financial business value behind data collection tasks
Practical training	Emphasis on local operation training	There are many individual exercises, but there is insufficient training in requirement analysis, webpage recognition, field design, data storage, and achievement expression in the complete project
Evaluation mechanism	Process evaluation needs to be refined	Further improvement is needed in the evaluation of student project processes, team collaboration, problem-solving, outcome presentations, and individual contributions

2.5 Evaluation Mechanism for Coarsening, Resulting in Insufficient Reflection of Students' Learning Abilities

The evaluation of the course should not only focus on whether the code runs successfully, but also on students' comprehensive performance in task analysis, data review, code debugging, team collaboration, data organization, result interpretation, and presentation during project implementation. If the evaluation is mainly based on the completion of classroom exercises or the final code results, it is difficult for teachers to accurately judge the true level of student participation in the project, and it is also difficult to comprehensively reflect the students' ability growth at different stages. Therefore, in subsequent teaching, project task books, process records, stage reports, code results, data files, project reports, classroom presentations, and peer evaluations should be included in the evaluation system, so that the evaluation focuses not only on the final output but also on the learning process and ability development.

In summary, the main teaching problems of the "Course of Application Practice of Python in Financial Scenarios" are shown in Table 1.

3. Teaching Design of the Course Based on Project Learning Method

The project teaching method emphasizes using real tasks or comprehensive projects as carriers to guide students to complete knowledge construction, ability training, and achievement expression during the project implementation process [3]. Compared with traditional teaching method, the project teaching method places more emphasis on the authenticity of learning situations, the completeness of task processes, and the initiative of student participation, making it particularly suitable for practical, applied, and comprehensive course teaching [4]. For the practical application of Python in financial scenarios, the introduction of the method can integrate relatively scattered knowledge points into specific financial data collection tasks, promote the transformation of course teaching from "technology centered" to "financial task driven technology learning", and enable students to truly understand the inherent connection between Python technology and financial business scenarios in the process of completing projects.

The framework diagram of teaching design for the course based on project teaching method is shown in Figure 1 [5,6].

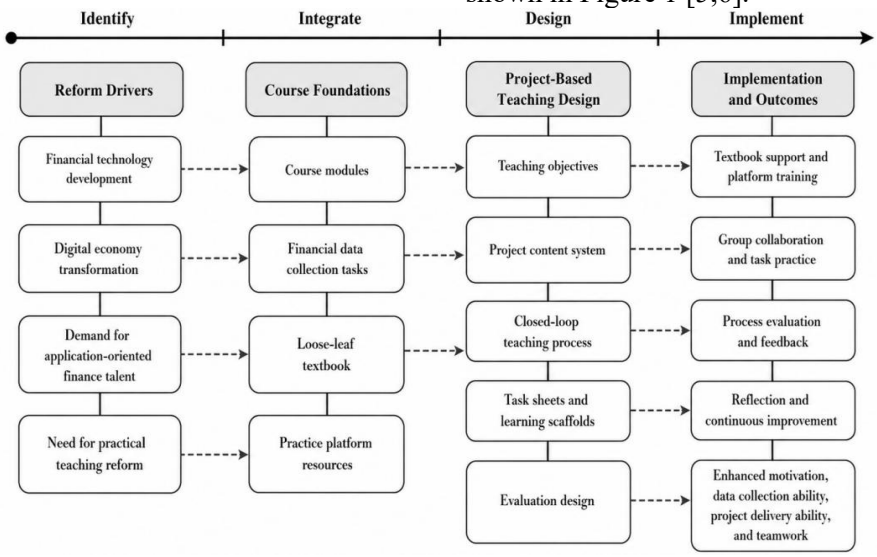

Figure 1. The Framework Diagram of Teaching Design for the Course Based on Project Teaching Method

3.1 Design of Project Teaching Objectives

The curriculum design based on project teaching method should be systematically restructured around course objectives, teaching content, learning process, and evaluation methods [7]. Based on the positioning of the course, project teaching objectives can be developed from three levels: knowledge, capability, and literacy.

(1) In terms of knowledge objectives, building a cross disciplinary knowledge system of "Python + finance". Require students to master the basic principles and core methods of Python data collection, understand web crawlers, web page structures, HTTP requests, Requests library, Get/Post requests, Sessions and Cookies, regular

expressions, Xpath, BeautifulSoup, Json parsing, CSV, Excel file storage, etc., and be able to clarify the roles of different technical methods in the data collection process.

(2) In terms of capability objectives, developing project practical capability to solve real financial problems. Students are required to have the capability to translate financial data requirements into program implementation logic, which means that they should not only be able to call code, but also be able to determine the collection object, analyze the target webpage, select request and parsing methods, design field structures, and complete data storage based on specific financial scenarios, gradually forming the capability to independently complete small-scale financial data collection projects.

(3) In terms of literacy objectives, shaping quantitative thinking and responsible awareness of technology application. Require students to possess awareness of data standardization, teamwork, and fintech ethics. Due to the involvement of online data collection in the course, students not only need to focus on "how to collect" during project implementation, but also need to understand data source compliance, website access rules, information usage boundaries, and financial data interpretation responsibilities.

3.2 Design of Project Teaching Content System

Based on the five teaching modules of the course, the teaching content can be restructured into a project task system that progresses from shallow to deep, from individual skills to comprehensive applications. This system no longer presents knowledge points in isolation, but integrates web analysis, request sending, information parsing, data storage, and case studies into a progressive project centered around financial data collection tasks. The stock bar review data, wealth management product information of CMB, financial industry stock data in A-share, corporate balance sheet information of ICBC, income statement information of ICBC, and other content in the course case can provide rich financial scenario materials for project teaching.

Table 2. Design of Project Teaching Content System for the Course

Project module	Project theme	Main tasks	Course contents	Capability cultivation
Project 1	Cognition of financial data collection tasks and analysis of web page structure	Understand web crawlers, analyze the structure of target web pages, determine the feasibility of data sources and collection, understand robots protocols and access standards	Understand web crawlers, page analysis, robots protocols, and webpage structure	Capability of scene recognition and webpage analysis, awareness of data compliance
Project 2	Request of financial information page and data acquisition	Use the Requests library to complete page requests, determine the Get/Post request method, and understand the roles of Session and Cookie	Requests library, HTTP protocol, Get requests, Post requests	Capability of request sending, parameter analysis, and basic code implementation
Project 3	Analysis of stock bar or product review data	Extract comment content, time, user information and other fields using Regular expressions, Xpath, BeautifulSoup, Json and other methods	Regular expressions, Xpath, BeautifulSoup, Json data parsing	Capability of extract information, select parsing methods, and design fields
Project 4	Storage of financial products and enterprise information data	Save financial product information, enterprise business information or financial fields in CSV, Excel and other formats, and check the standardization of the results	CSV file storage, Excel file storage	Capability of data organization and result storage, awareness of data specification
Project 5	Comprehensive practical experience of financial data collection	Complete the complete project around cases such as Shanghai and Shenzhen A-share stock data, bank financial statement information, etc	Web crawler case practice	Capability of project integration, problem-solving, achievement delivery and financial scenario understanding

Design of project teaching content system for the course are shown in Table 2.

The project teaching content system of the course reflects three characteristics: (1) The project content corresponds to the course chapters, ensuring that the teaching reform is consistent with the curriculum outline and textbook content. (2) The difficulty of the project gradually increases, which conforms to the development law of students from basic cognition to comprehensive practice. (3) The project context has financial professional attributes, which can help students understand the application value of Python technology in financial information collection, financial product comparison, listed company data organization, and financial information analysis while learning Python technology [8]. Specifically, Project 1 focuses on basic cognition and web analysis, Project 2 focuses on page requests and data acquisition, Project 3 focuses on information parsing, Project 4 focuses on data storage and result standardization, and Project 5 focuses on comprehensive applications. Through the progressive design of these five projects, students can gradually improve their abilities from "understanding the process" to "mastering the methods", and then to "independently delivering projects".

3.3 Design of Project Teaching Process

To ensure the effective implementation of project teaching, the course can construct a seven stage teaching process of "task introduction → project analysis → project implementation → collaborative exploration → achievement display → evaluation feedback → reflection improvement", as shown in Figure 2. This process not only reflects the task driven characteristics of project teaching method, but also conforms to the practical logic of the course from webpage analysis, page request, information parsing to data storage and achievement display.

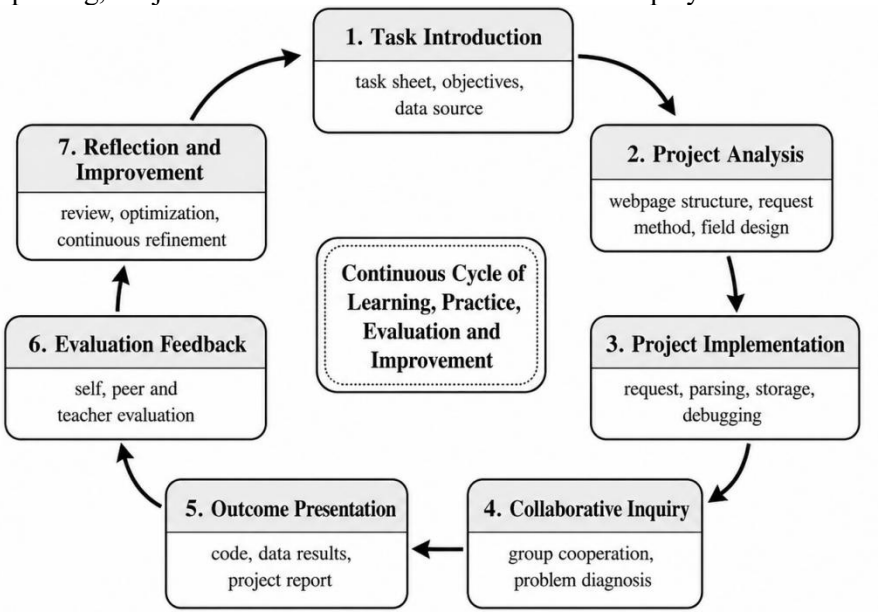

Figure 2. Design of Project Teaching Process for the Courses

Step 1, Task introduction. Teachers release project task books based on the objectives of the course unit, clarifying the project background, task objectives, data sources, technical requirements, outcome forms, and evaluation criteria. For example, in the project of "Bank wealth management product information collection", the task book not only needs to explain the fields of product name, term, yield, risk level, etc. that need to be collected, but also needs to explain that the data can serve the comparative analysis of wealth management products, so that students can understand the financial business significance behind the technical task.

Step 2, Project analysis. Before entering the code implementation, students need to complete the analysis of the target webpage structure, determination of request methods, and field design, clarify whether the data is directly presented in the HTML page or returned through interfaces or dynamic loading methods, and preliminarily determine the field names, meanings, and storage formats.

Step 3, Project implementation. Students complete page requests, data parsing, result

storage, and code debugging operations according to task requirements. Teachers can break down complex projects into several phased tasks, such as "completing the target webpage analysis table", "completing the request test", "completing field extraction", "completing data saving", "completing result explanation", to reduce the difficulty of students' entry and facilitate process guidance.

Step 4, Collaborative exploration. Considering the significant differences in programming foundations among finance students, it is advisable to adopt a group collaboration approach for project implementation. Each group can consist of 3-4 students, who are responsible for tasks, such as webpage analysis, code implementation, data inspection, report writing, and result presentation.

Step 5, Presentation of results. After the project is completed, each group will present their work around the project background, task division, technical roadmap, core code, data results, and problem reflection.

Step 6, Evaluate feedback. Teachers provide comprehensive feedback on the project process and results by combining student self-evaluation, group peer evaluation, and teacher evaluation.

Step 7, Reflect and improve. Students review the project based on evaluation feedback, further optimize the code structure, improve data results, revise field designs, and supplement project descriptions.

3.4 Design of Project Teaching Task Sheets and Learning Scaffolds

The effective implementation of project teaching method depends on whether teachers can provide clear project task sheets and appropriate learning scaffolds. The project task sheets should include at least six parts: project background, project objectives, data sources, technical requirements, achievement requirements, and evaluation criteria, so that students can clarify the project's "why, what, how, and to what extent". Meanwhile, the learning scaffolds should be gradually adjusted according to the difficulty of the project. In basic projects, teachers can provide target page examples, request method judgment methods, key code templates, and field extraction demonstrations to help students master the basic process; In advanced projects, teachers can reduce code prompts and provide more problem lists and debugging suggestions; In comprehensive projects, teachers only provide project background and outcome requirements, encouraging students to independently choose target data, design field structures, and complete code implementation.

By gradually removing learning scaffolds, students can transition from "imitation completion" to "independent completion". For example, in the project of "Stock bar comment data analysis", (1) Provide a webpage structure observation table to guide students to record the position of fields such as comment content, username, and publishing time [9]. (2) Provide a comparison table of different parsing methods to guide students in determining the applicable conditions for regular expressions, Xpath, BeautifulSoup, or Json. (3) Students are required to independently complete field extraction, data storage, and result explanation. This design can not only lower the operating threshold for beginners, but also preserve the space for independent exploration in project teaching [10].

4. Teaching Implementation of the Course Based on Project Learning Method

Based on project teaching method, the implementation of courses should integrate project tasks throughout the entire process, enabling students to complete knowledge learning, skill training, collaborative practice, and achievement expression in real or simulated financial data collection scenarios. As the course aims to enhance students' abilities in targeted data collection and problem-solving in real financial scenarios. Therefore, teaching implementation should rely on course outlines, loose leaf textbooks, and practical teaching platforms, forming an implementation mechanism of "textbook support, platform training, project driven, and evaluation follow-up".

4.1 Integrating Teaching Resources through Loose-Leaf Textbooks and Practical Platforms

The effective implementation of project teaching method requires stable and systematic course resources as support. The loose-leaf textbook of the course revolves around the core process of "requesting, parsing, and storing data," covering topics such as basic web scraping, methods for page requests, information parsing techniques, data storage approaches, and financial case studies, providing a relatively comprehensive

knowledge framework for project teaching. Additionally, the course conducts practical training based on the "Python Data Collection and Application Practice Teaching Platform," which includes case resources such as stock forum comments, wealth management product information of CMB, financial industry stock data in A-share, and corporate balance sheet information of ICBC, offering abundant practical materials for project instruction.

In practice, the loose-leaf textbook primarily serves functions such as knowledge explanation, method illustration, and project guidance, while the practical platform mainly handles task training, code execution, and result submission. Teachers integrate the knowledge points of the textbook, the case resources of the platform, and financial scenario requirements to form a continuous chain of project tasks. Through the synergy of the textbooks, the platforms, and classroom teaching, students can gradually enhance their financial data collection capabilities in a "learn-practice-do-evaluate" cycle.

4.2 Promoting Teaching in a Progressive Manner of "Fundamental Unit Project → Skill-Based Unit Project → Comprehensive Project"

Based on the content structure of the course, a progressive teaching approach of "unit projects→ comprehensive projects" can be adopted. Unit projects primarily focus on designing specific course modules to train students' partial skills, while comprehensive projects revolve around complete financial data collection tasks, aiming to evaluate students' overall knowledge transfer and application capabilities.

In the early stages of the course, fundamental unit projects are designed around "Understanding crawling" and "Page data collection." For example, students are guided to analyze financial news pages, stock information pages, or bank product pages by identifying URLs, determining request methods, checking response status codes, analyzing headers information, and reading robots.txt protocols. This phase focuses on cultivating students' awareness of webpage analysis and data collection standards, rather than directly pursuing complex code implementation.

In the mid-term of the course, skill-based unit projects are designed around "Information Data Parsing" and "Web crawler Data Storage." For instance, students are tasked with extracting specified fields from stock forum comments, financial product information, or corporate business registration details using regular expressions, XPath, BeautifulSoup, or Json methods, and saving the results as CSV or Excel files. Through such projects, students can understand the applicable conditions of different parsing methods and storage approaches, gradually developing their abilities in data extraction and result organization.

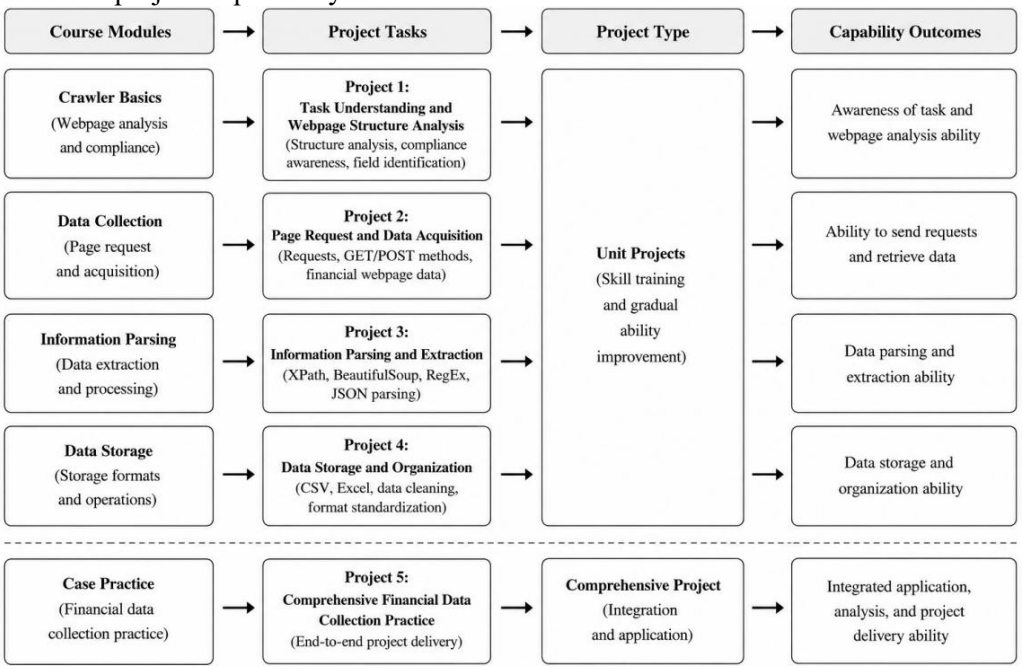

Figure 3. Progressive Relationship between Course Modules and Project Tasks

In the later stages of the course, a comprehensive project is designed around the "Web crawler case studies" theme. For example, project topics include "Stock Data Collection of financial industry in A-shares" and "Balance Sheet Information Collection for ICBC." Students are required to complete the entire process, from task analysis and target site selection to page requests, field parsing, data storage, and finally project report writing and classroom presentations. Through these comprehensive projects, students can integrate the knowledge acquired earlier into complete deliverables, achieving the transition from "being able to operate" to "being capable of delivering".

To further clarify the progressive organization of the course projects, the five projects are arranged according to the internal sequence of the course modules. Projects 1–4 function as unit projects that support students' acquisition of basic cognition, page request, information parsing, and data storage skills, while Project 5 serves as a comprehensive project that integrates these skills into financial data collection practice. The progressive relationship among course modules, project tasks, and capability outcomes is shown in Figure 3.

4.3 Implementation Process of Building Classroom Internal and External Linkage

The project teaching method emphasizes students' active participation, but it does not mean that teachers completely let go. For students majoring in finance, due to differences in their programming foundation and web analysis skills, the implementation of the course should form a linkage mechanism before, during, and after class.

In the before class stage, teachers release project task books, preview materials, and problem lists through practical platforms to guide students to understand the project background, data sources, and key knowledge points in advance. Before carrying out the "Wealth management product information collection" project, students are required to understand the meanings of fields such as the name of the wealth management product, risk level, term, yield, and minimum purchase amount, so that they can first understand the financial significance of the data itself.

In the during class stage, teachers organize teaching through a combination of necessary explanations, task advancement, and immediate guidance. The teacher will provide concise explanations on core knowledge points such as Get/Post request judgment, Xpath node localization, Json data structure recognition, and CSV/Excel file writing; For project tasks, leave enough time for students to group and complete web analysis, code debugging, and result checking. When students encounter problems such as request failures, field extraction errors, and confusing data formats, teachers guide them to independently investigate by prompting request headers, response status codes, webpage structures, parsing paths, and other methods.

In the after class stage, students need to further improve their classroom projects, including organizing code, checking data files, writing project descriptions, and preparing for presentation of results. Teachers may require students to submit process materials such as webpage analysis tables, field design tables, code screenshots, running results, data files, and problem reflections, providing a basis for subsequent classroom guidance and project evaluation.

4.4 Improving the Assessment Mechanism of "Process Evaluation + Outcome Evaluation"

Based on project teaching method, improve the evaluation index system of "process evaluation + outcome evaluation" to better reflect students' ability growth and final outcome quality in the project process. The design of the evaluation index system of project teaching for the course is shown in Table 3, the weights of each index are obtained based on expert scoring.

The evaluation index system has three characteristics: (1) It covers the entire project process and can reflect the complete learning status of students from task understanding to outcome delivery. (2) It balances technical skills and financial understanding, focusing on both code implementation and data fields, business meanings, and application value. (3) It highlights process feedback, which can encourage students to continuously improve in multiple projects, rather than waiting until the end of the course to discover problems.

In the specific evaluation process, teachers can embed process evaluation into each stage of the project. During the stages of task introduction and project analysis, focus on evaluating students' understanding of financial scenarios, target web pages, and field structures. During the stage of project implementation, the focus is on

evaluating students' abilities in code debugging, method selection, and data processing. In the stage of presenting achievements, the focus is on evaluating students' ability to explain the technical roadmap, data results, and financial application value. Through phased evaluation, it is possible to avoid the single judgment method of "only looking at the final result" and make students pay more attention to continuous learning and ability accumulation during the project process.

Table 3. Evaluation Index System of Project Teaching for the Courses

Evaluation Type	Evaluation index	Index weight	Key evaluation points
Process evaluation	Attendance and classroom participation	10%	Classroom participation, project analysis enthusiasm, and problem discussion performance
	Completion status of unit projects	20%	Quality of task completion in stages such as webpage analysis, request testing, field extraction, and data storage
	Team collaboration and process documentation	10%	Group division of labor, process materials, problem records, and stage feedback
	Project reflection and improvement	10%	Summarize the problem, optimize the code, refine the data results, and project description
Outcome evaluation	Comprehensive project code quality	20%	Is the code structure clear, is the functionality complete, and is the running result stable
	Quality of data results	15%	Whether the fields are complete, the format is standardized, and the data results have subsequent analytical value
	Project report and financial explanation	10%	Whether the project background, technical roadmap, field meanings, and financial application value are explained
	Achievement display and defense	5%	Is the presentation clear and able to respond to questions from teachers and classmates

4.5 Strengthening Data Compliance and Professional Competence Evaluation

Due to the involvement of online data collection in the course content, data compliance and professional ethics should be included in the evaluation index system during teaching implementation. The setting of course content such as Robots protocol, anti-crawling and its response strategies indicates that the course not only trains students to master data collection techniques, but also guides them to understand website access rules, data collection boundaries, and technical usage norms. Therefore, in the project task book and evaluation criteria, it should be clearly required that students prioritize selecting data sources within the scope of public pages and teaching licenses, and not collect data involving personal privacy, sensitive transactions, or non-public authorizations. In the project report, the data source, collection purpose, and scope of use should be explained. During code execution, it is important to avoid frequent visits that can put pressure on the target website. For project results that violate data compliance requirements, even if the code can run, it should not be given a high evaluation.

At the same time, guide students to develop an ethical awareness of financial technology. The results of financial data collection and analysis may affect investment judgments, risk identification, and financial decisions. Therefore, students should be cautious when interpreting data results, avoiding exaggerating code results or making unfounded financial judgments. By incorporating data compliance, professional ethics, and outcome interpretation into the evaluation system, this course can better reflect the dual requirements of applied finance talent cultivation for professional competence and professional ethics.

5. Analysis of the teaching Implementation Effectiveness of the Course Based on Project Learning Method

5.1 Analysis of the Teaching Implementation Effectiveness of the Course

After introducing the project teaching method into the "Course of Application Practice of Python in Financial Scenarios", the course teaching has gradually shifted from focusing on knowledge point lectures and code demonstrations to a practical teaching mode with financial data collection tasks as the main line and project deliverables as the guidance. In the process of completing project tasks, students not only need to understand the basic methods of

Python data collection, but also need to analyze data requirements around specific financial scenarios, determine webpage structure, choose parsing methods, complete data storage, and display project results. From the perspective of overall teaching implementation effect, the project teaching method helps to promote students' overall understanding of the course knowledge system and promote the formation of comprehensive application abilities in real tasks.

Firstly, students' initiative in learning has been enhanced. In traditional practical teaching, students tend to understand Python learning as grammar memorization and code imitation, and the learning process is relatively passive. The project teaching method embeds technical learning into specific tasks by setting up financial data collection scenarios, enabling students to have a more intuitive understanding of the application value of Python technology in financial data acquisition, financial product comparison, listed company information organization, and financial data collection. For example, in the "Bank Wealth Management Product Information Collection" project, students are no longer just completing a single code exercise, but need to consider the purpose of data collection, the basis for field selection, and the subsequent value of data results. This task scenario can enhance students' sense of learning objectives, gradually shifting them from "passively completing experiments" to "actively solving problems".

Secondly, students have a clearer overall understanding of the course knowledge system. The course content is relatively rich, covering multiple aspects such as web crawler basics, page requests, information parsing, data storage, and case studies. The project teaching method integrates dispersed knowledge points into a complete project through real or simulated financial data collection tasks. Students need to go through the stages of target site analysis, request sending, field parsing, data storage, and result display in the project, gradually realizing that Requests, Get/Post requests, regular expressions, Xpath, BeautifulSoup, Json, CSV, and Excel are not isolated entities, but serve different stages of the data collection project. Through the project training, students can have a clearer understanding of the applicable conditions of different technical methods, reducing the problem of "only knowing how to code and not choosing methods".

Thirdly, the ability of students to collect financial data and deliver results has been improved. The core value of project teaching method lies in guiding students to complete the transformation from knowledge learning to outcome generation. For the course, what students ultimately need to form is not only a piece of code that can run, but also a clear project idea, standardized data results, and complete expression of results. During the implementation of project teaching, students complete task analysis, code writing, data organization, report writing, and classroom presentations in groups. Students not only need to answer questions such as "whether the code runs successfully", but also explain "which fields were collected", "why these fields were selected", "whether the data storage format is standardized", and "whether the data results can serve subsequent financial analysis". Especially in comprehensive practical projects, students need to integrate their previous knowledge and complete the complete financial data collection task. This process can effectively promote students to combine Python programming skills with financial professional knowledge, and enhance their ability to solve real business problems.

Fourthly, students' teamwork and communication skills are trained. The project teaching method is usually implemented in groups, providing conditions for the cultivation of students' teamwork ability. During the project implementation process, group members need to divide tasks according to task requirements, such as being responsible for web page structure analysis and field design, code writing and debugging, and data checking, project reporting, and classroom presentations. Different roles collaborate with each other to jointly achieve the final project outcome. The collaborative approach can to some extent alleviate the learning difficulties caused by differences in students' foundations, and also deepen students' understanding of course content through communication. The achievement display section can train students' professional expression ability, enabling them to transform technical operations into expressive, communicative, and evaluative learning outcomes.

5.2 Teaching Reflections and Improvement Measures

There are still some problems that need to be improved in the specific implementation process of project teaching method for the course. (1) The difference in programming foundation among students remains an important factor affecting the effectiveness of project teaching. Some students are able to quickly understand webpage structure and code logic, and independently complete project tasks, while some students have difficulties in Python basic syntax, library calls, error debugging, and other aspects. (2) The project schedule needs to be further optimized. Compared with single classroom exercises, project teaching requires multiple stages such as task introduction, webpage analysis, code implementation, data storage, achievement display, and evaluation feedback, which consumes a lot of teaching time. (3) The connection between financial business logic and technological implementation still needs to be deepened. Some students are able to complete data collection and storage in the project, but their understanding of the financial meaning of data fields and the analytical value of project results is not deep enough. (4) The project evaluation system need to be further refined, especially in group projects. How to evaluate individual contributions and determine whether students truly understand the project logic are issues that need to be further improved in subsequent teaching.

In response to the above issues, the subsequent course construction can be further optimized in the following four aspects: (1) Improve the hierarchical project task system to provide different levels of learning scaffolds for students with different foundations. (2) Strengthen the introduction of financial scenarios and the explanation of business logic to help students understand the practical significance of data collection tasks. (3) Optimize the schedule of project teaching, highlight representative projects and comprehensive practical projects, and avoid project teaching becoming task stacking. (4) Establish a sound mechanism for diversified evaluation, incorporating webpage analysis tables, field design tables, code files, data files, project reports, classroom presentations, personal reflections, and peer evaluations within the group into the evaluation index system, so that evaluation truly serves learning improvement.

6. Conclusion

This article takes "Course of Application Practice of Python in Financial Scenarios" as the research object, and introduces project teaching method for teaching design and implementation research.

From the perspective of teaching design, project teaching method can better fit the characteristics of the course. The course itself revolves around the basic process of "sending requests→ parsing data → storing data". The loose leaf textbooks gradually progress through the basics of web crawling, page data collection, information data parsing, data storage, and case studies. Therefore, restructuring the course content into a progressive project task system can integrate the originally relatively scattered knowledge points into a continuous chain of practical tasks, helping students form a complete project thinking of "requirement analysis → target site identification → request sending → data parsing → data storage → achievement display".

From the perspective of teaching implementation, the course relies on loose leaf textbooks, course outlines, and practical teaching platforms to form collaborative support. In the specific implementation process, teachers adopt a progressive model of "unit project → comprehensive project". In the early stage, students' process awareness is established through tasks such as webpage structure analysis and request method judgment. In the middle stage, their analytical and storage abilities are trained through case studies such as stock bar comments, financial product information, and enterprise information. In the later stage, students' overall application ability is tested through comprehensive projects such as financial industry stock data in A-share and bank financial statement information.

From the perspective of teaching implementation effect, project teaching method helps to promote the transformation of course teaching from knowledge teaching to task driven, from local code training to complete project delivery, and from single technology learning to the integration of financial business understanding and data practice ability. In the process of project implementation, students no longer passively imitate teacher code, but need to conduct task analysis, webpage observation, code debugging, field design, data organization, and result explanation around specific financial scenarios. This process can help students

understand the connection between Python technology and financial business needs, and cultivate their abilities in problem analysis, teamwork, and outcome expression.

In summary, the teaching design and implementation of the "Course of Application Practice of Python in Financial Scenarios" based on project teaching method can effectively respond to the requirements of data collection ability, technical application ability, and practical problem-solving ability for the cultivation of applied financial talents in the context of financial technology. The subsequent course construction can further focus on the continuous optimization of "realistic financial scenarios, progressive project tasks, layered learning frameworks, and diversified evaluation mechanisms", and jointly build a project case library with financial institutions, fintech enterprises, and campus practice platforms to continuously improve the practicality, openness, and professional adaptability of course teaching.

References

[1] Gang Liu, Yuantong Li, Qiaoyan Ji. Research on the Construction of Financial Professional Curriculum System in Applied Undergraduate Universities under the Background of Financial Technology: A Case Study of Jilin University of Chemical Technology. Journal of Jilin University of Chemical Technology, 2024, 41(8):29-33.

[2] Lei Wang, Yingbo An, Jiajie Liu. Python based Internet financial data collection. Cooperative Economy and Technology, 2017(9):47-49.

[3] Xiangyin Cai, Li Li, Min Zhang. The elements and implementation strategies of project-based teaching method. China Vocational and Technical Education, 2022(12):68-73.

[4] Jianfeng Hu. Research on the Application of Project Teaching Method in Vocational Education. Vocational and Technical Education, 2021, 42(26):45-49.

[5] Yutao Wang, Yuliang Fang, Xinjin Xiao. Detailed explanation of the entire process of Python financial big data mining and analysis. Machinery Industry Press, 2019.

[6] Wenbin Hu. Financial Data Analysis: Using Python as a Tool. Xi'an University of Electronic Science and Technology Press, 2022.

[7] Wenchao Ma, Yanxia Xu. Design and Implementation of Internet Finance Practice Course Based on Project Teaching. Journal of Jiamusi Vocational College, 2025, 41(4):179-181.

[8] Liqin Zhao, Wenjie Fan, Fasheng Yi, et al, Exploration and Practice of Guided Teaching for Non Computer Majors in Universities in the Era of Artificial Intelligence: A Case Study of Python Programming. Computer Knowledge and Technology, 2024, 20(31):168-170.

[9] Jeyaraj A. Teaching Tip: Scaffolding in Business Analytics Education: Using Python for Web Scraping. Journal of Information Systems Education, 2024, 35(4):438-450.

[10] Ping Liu, Fang Ji, Wenying Wu. The Application of Project based Teaching in Experimental Courses of Broadcasting and Television Major. Experimental Technology and Management, 2016, 33(11):219-222.

