

Analysis on the Training Path of Data Literacy Ability of Financial Talents in the Era of Digital Economy

Cuixia Liu

School of Finance, Chongqing Technology and Business University, Chongqing, China

Abstract: With the rapid development of informatization, data has become a new element, and data literacy is a key element in the training of new financial talents. This study demonstrates the necessity of financial data literacy talent construction, analyzes the core ability of financial data literacy talent training in the era of digital economy. It includes capabilities such as data acquisition ability, real-time data analysis ability, system model construction ability, programming ability, etc. In addition, a financial data literacy training framework is built, data literacy content is reconstructed from the two dimensions of value literacy and skill literacy, a three-dimensional integrated teaching environment of "classroom + laboratory + experience site" is created and teaching mode innovation is achieved. A multi-dimensional assessment system is implemented, and a financial data literacy training path based on teaching framework, teaching content, teaching mode and teaching assessment is finally formed.

Keywords: Data Literacy; Real-time Analysis; Programming Ability; Scene Teaching

1. Introduction

With the development of science and technology and the profound changes brought by science and technology, finance is experiencing a technological revolution based on digital. The data it faces is multi-source heterogeneous data generated in real time, with huge volume and complex types, which is a new challenge for data processing, data analysis and data operation talents. At this stage, the structural contradiction between the supply side and the demand side of the financial industry is becoming increasingly prominent. According to the specific needs of the development of the financial industry for

financial talents in the new era, it is important to strengthen the data literacy capacity building of financial talents.

2. The Importance of Data Literacy and Ability Standards

The concept of data literacy originated from Paul Gilster's book *Digital Literacy* published in 1998, which defined data literacy as "the ability to obtain resources from the network on a computer and be able to use them". In recent years, data literacy has attracted great attention from the world. The Prague Declaration and the Alexander Declaration issued by UNESCO in 2003 and 2005 respectively are the benchmark of The Times that attaches great importance to information literacy after the 21st century, and make it clear that data information plays an important role in the fields of politics, economy, education and culture[1]. In 2015, the Association of University and Research Libraries (ACRL) of the United States formulated and issued the Framework for Information Literacy in Higher Education. The European Commission published three reports on digital capacity development in 2013[2]. Many countries, including Japan, Australia and Singapore, have introduced policies to enhance data and information literacy education in institutions of higher learning. In China, the Ten-year Plan for Education Informatization issued in 2012 established the "two-step" strategy for the development of education informatization in China. In 2014, the Humanities and Social Sciences Project was established to study the impact of data literacy[3]. On Informatization in 2016, it was proposed to further refine the indicator system of teachers, learners, resources and informatization. The "Education Informatization 2.0 Action Plan" released in 2018 marks a new step for university data information literacy. The Key Points for Improving Digital Literacy and Skills of the whole People by 2024, which set specific goals

for data literacy[4].

In terms of data literacy competence standards, the American Association of University and Research Libraries (ACRL) has given a clear definition of data literacy, and formulated data literacy standards and specific implementation indicators, which were revised again in 2015, and eventually formed 45 knowledge and skill indicators and 38 behavioral skill indicators[5]. In 2017, China issued the network literacy standard evaluation system, which specifically includes 10 standards of network literacy. Peking University Library has improved the data information literacy system and proposed three major connotations of data information literacy, namely digital literacy, media literacy and data literacy[6]. In 2023, the Ministry of Education will release the standards for Teachers' Digital Literacy, which define the requirements for teachers' digital literacy from multiple dimensions, including digital awareness, digital technology knowledge and skills. According to China's planning requirements, the data literacy competency standards are determined as follows: Standard 1: ability to determine the nature and scope of required information, standard 2: ability to obtain required reasonable and legal information, standard 3: ability to screen and evaluate information, standard 4: ability to integrate information into their own knowledge base and value system, standard 5: ability to integrate information into their own knowledge base and value system The ability to combine multidisciplinary knowledge and professional knowledge to realize the cross-fusion of data information and professional information.

3. The Necessity of Data Literacy and Ability Training for Financial Talents

3.1 The Digital Transformation and Development of the Financial Industry Urgently Need Data Literacy Talents

In the era of rapid information development facilitated by technology, the decision-making paradigm of financial management has gradually changed from an experience-oriented decision-making paradigm to a data-driven decision-making paradigm that integrates human wisdom. Data plays a pivotal role in decision-making in risk management, customer service, product research and development and innovation.

Through data acquisition and operation data, data can generate value; Identify abnormal behavior in real time through market feedback to avoid risks; And provide personalized and customized services by mining customer needs. With the deep integration of big data technology and finance, the rapid construction of financial cloud and the deep application of artificial intelligence, the financial industry has an increasingly urgent need for technical talents who can analyze and process data. According to the report "White Paper on the Development of China's Big Data Industry 2020", the scale of demand for big data talents in China is as high as 20 million by 2025. At this stage, the financial industry urgently needs to cultivate cross-disciplinary talents with both financial thinking and data literacy, and cultivate "five-in-one integration" data literacy talents with strong data acquisition ability, algorithm foundation, programming ability, data mining analysis ability and data conversion ability. Data literacy has become one of the core literacy of new financial talents in the future[7].

3.2 The Complex Financial Data with Multiple Sources and Heterogeneity puts Forward New Requirements for Data Analysis Talents

At present, financial data not only includes structured numerical data, but also includes unstructured text data, audio data, video data and other data. The complexity and diversity of data increase the difficulty of processing. In the face of complex data from different sources, while generating massive data, multi-source heterogeneity, strong noise and high repeatability have become the new characteristics of modern data. Therefore, data cleaning, data weight and noise reduction, processing, analysis and mining data, as well as the virtual 4D world that presents the twin of the real world have become the new requirements of data processing ability. Traditional data analysis talents often do not have these new data literacy abilities, and the training of these new data literacy abilities is difficult and the cycle is long, which puts forward new requirements for the training of data analysis talents and the ability of data analysis talents[8].

3.3 The Digital Development of the Financial Industry Requires more Powerful Algorithms and Computing Power Support

The integration of cloud computing, big data, artificial intelligence and other new technologies poses new challenges to computing power and algorithms. It is necessary to build a large model supported by nested algorithms and computing power, and open up the data correlation between systems to realize the operation of data without touching the data, so that the data can complete the automatic operation from input to process processing and output. Behind it is a powerful algorithm and computing power support, which puts forward higher requirements for data analysis and mining talents, and faces arduous new challenges[9].

3.4 The New Financial Era Faces New Risks and Challenges

Amid profound changes unseen in a century, the global economic environment is diversified and the regulatory environment is more complex. The risks that the financial sector may face are more arduous and challenging. At the same time, with the rapid development of financial technology, while technology brings changes, technology instability, technology leakage and system failure have become new technical risks. With the continuous innovation of financial products and services and the popularity of digital currency, the financial system faces more complex market risks; New liquidity risks arising from digital currencies and electronic payment systems; And financial institutions' operations are increasingly dependent on automated systems and third-party service providers, which may increase operational errors and third-party risks. Many new risks arising from new things, new models and new developments rely on traditional risk control and management, which is difficult to identify and cope with. It is crucial to use big data analysis to find problems from operational data in a timely manner and identify risks, which puts forward new requirements for the ability to use big data technology and models to identify and perceive risks in real time[10].

It can be seen that the financial industry needs to train a large number of digital technical talents and improve data literacy to enhance

the transformation of financial life cycle services through digital means and build and form a digital financial ecology. In this way, financial services can better adapt to changes in the scene, improve competitiveness, and provide customers with better quality services. Through the integration of system resources, cooperation and symbiosis sharing mode, build a digital base, operate data based on codes and algorithms, provide more comprehensive real-time services, enhance scene experience and dynamic risk management, enhance customer stickiness, and create new value.

4. Data Literacy Core Capacity Building of Financial Talents

4.1 Big Data Acquisition Ability

In order to realize data-based operation, the first thing to do is to build a digital base, integrate multiple resources, and build a data resource platform based on big data. The traditional ways and methods of collecting secondary data cannot meet the data needs of the big data resource platform. The ability to obtain data by using new methods and new means constitutes the basis of data literacy ability. Its ability to acquire data is mainly reflected in the following aspects. First, it should further standardize and improve the internal free data system, open up a large number of customer information, transactions, assets and liabilities data accumulated by financial institutions over the years, and make the data standardized, unified and systematic. Second, to build a shared platform by integrating the resources of enterprises, consumers, platforms and other parties, establish a data co-construction and sharing mechanism, improve data encryption policies, and reserve related data for deep-level financial management and services. Third, open up multiple API interfaces, obtain data from different data platforms, cooperate and share with data platforms, obtain industry and professional data, and store energy for deep mining data information and financial innovation; Fourth, rely on the crawler method based on machine learning to obtain a large number of fragmented data.

4.2 The Ability to Analyze Data in Real Time

In the era of the Internet and the Internet of

Things, real-time analysis and mining capabilities are essential for all kinds of financial and related data generated in real time. To deal with a huge amount of multi-source heterogeneous data, a complete set of large model system framework is needed to receive and process the data flow in real time. It is necessary to master a variety of machine learning models and algorithms, and use data analysis software based on scripting language to realize real-time disassembly and analysis of data and real-time operation data. The process of using data analysis technology to process and analyze large amounts of financial data, with the aim of discovering patterns, trends and correlations in the data, thereby helping financial institutions make more rational decisions.

4.3 The Ability to Build System Models

Large model construction in financial system is a complex process, involving data collection, model design, training, evaluation, deployment and prediction. In model design, it is necessary to determine characteristic variables according to specific task requirements, build a network model based on deep learning network and simulated nervous system, and feedback the input to output data operation process and decision-making process. The analysis conclusions and Revelations are obtained, and the judgment accuracy of the model is tested through the continuous backtracking of the test samples. After repeated correction and cyclic correction, the final stable model system is used to assist decision making and operation.

4.4 Programming Ability

In the new financial era with the development of technology finance and digital finance, programming ability has become a necessary ability for financial data literate talents. In order to realize various major functions such as intelligent financial quantitative trading, financial precision marketing, financial risk management, credit evaluation, investment management and capital supervision, it is necessary to build models based on problems, and finally realize its intelligent process through program language. Need to program the algorithm, program modularization, to achieve the integration of modules and modules, algorithms and algorithms nested, commonly used programming languages

including Python, R, Java, C++, SQL and so on. Python and R are particularly popular because of their strong library and framework support in data analysis, statistical modeling and machine learning. As technology continues to advance, the importance of programming ability in the financial sector will continue to grow.

5. Data Literacy Training Paths for Financial Talents

5.1 Build a Content System for Data Literacy Personnel Training

In this study, data is more broadly understood as information, which refers to the information that records and describes objective things, including digital, text, audio, video, pictures and other forms of information. Data literacy is generalized data literacy, that is, information literacy. In this study, data literacy is divided into technical literacy and value literacy. Technical data literacy refers to the ability to obtain information, identify information, analyze information, present information, and use and operate and manage information by technical means. Value data literacy refers to the ability to perceive data, attach importance to data value and data privacy, respect data rights, and obtain, use, manage and trade data in accordance with laws and regulations.

It is very important to cultivate the ability of data value literacy. On the one hand, it is necessary to strengthen the sensitivity and importance of data. On the other hand, the construction of data rights and data security deserves attention. Therefore, data value literacy includes seven dimensions: data sensitivity, data importance, data security, data laws and regulations, data rights and permissions, data transformation and application, and data innovation ability.

Data technology literacy ability training, according to the specific needs of financial enterprises for data literacy talents, decomposes tasks, decomposes goals, and forms the content based on data literacy talents ability. Specifically, it includes data acquisition ability, data preprocessing ability, digital base building ability, data model building ability, data analysis ability, data mining ability, data visualization ability, data algorithmic ability and data programming ability.

5.2 "Platform Building, Course Leading", Step to Promote Data Literacy Content Innovation

Reconstruct the teaching content by means of "eliminating redundancy, adding new, reorganizing and integrating", build a learning ladder of data literacy courses that "understand principles, can apply and can innovate", and solve the core problems of financial big data literacy such as "what is", "what to do" and "what to innovate". Design the teaching content along the lines of "financial data problems -- combination of financial data problems and curriculum knowledge -- solving classroom problems -- improving classroom problems -- improving classroom theories", including data value literacy ability and data technology literacy ability.

Data value literacy refers to the attitude and cognitive ability of an organization or an individual to understand and use data, as well as the comprehensive embodiment of the ability to protect the rights of data and attach importance to data. Specifically, it includes: data sensitivity, data security, data laws and regulations, data innovation, etc.

Data technology literacy refers to the skills and knowledge for checking, understanding, evaluating, creating, analyzing and applying data, including the comprehensive training of data acquisition ability, data preprocessing ability, digital base construction ability, data model construction ability, data analysis and mining ability, data visualization ability, data algorithm programming ability and technical ability.

5.3 The Training Process Integrates Industrial Elements Throughout the Whole Cycle to Enhance Core Competitiveness

Integrate industrial development into the whole cycle of data literacy talent training, stimulate students' potential through multiple modes such as "competition", "debate", "adjustment" and "questioning", and cultivate students' ability in multiple dimensions. Industrial elements are integrated into the student competition, and the industry tutors are trained jointly by the course team, so that the participating materials come from the industry and the solutions are restored to the industry. Industry elements are integrated into the classroom teaching, and industrial elements are

integrated into the teaching through various ways such as debate, case explanation, and enterprise data analysts. Carry out projects to enhance the application ability, go to financial enterprises to investigate the main problems and pain points in the quantification process of enterprises, and form the project theme of "theory + practice". Industrial elements were incorporated into the training of innovation ability, teaching links were designed through the "question and answer" mode, and course processes were designed according to "proposing industrial quantitative problems - thinking about problems - solutions - testing schemes - forming conclusions". Each time a new conclusion was formed, the next problem was triggered and solved according to conditions and scenarios.

5.4 To Create a Three-dimensional Integrated Teaching Environment of "Classroom + Laboratory + Experience Site"

Through the innovation of "going out + bringing in" teaching mode, while effectively utilizing the school's hardware and software facilities and multidisciplinary resources, combined with enterprise materials, the three-dimensional integrated scene-oriented teaching program of "classroom + laboratory + experience site" is realized. "Into the enterprise", the course teacher team went into the long-term cooperation of financial enterprises, science and technology enterprises, data enterprises in-depth research, understand the status quo of quantitative development of enterprises, learn quantitative programs, form teaching and research materials, and integrate the materials into the course construction; Lead students to study and research in enterprises according to specific projects and tasks. "Introduction to the classroom", the enterprise data analysis experts are invited to the classroom through offline and online ways to increase the vividness and practicability of the course.

5.5 Take Data Literacy Assessment as the Core Assessment Factor for the Training of Financial Talents

In the core literacy assessment of financial talents, in addition to professional literacy assessment, moral literacy assessment and language literacy assessment, data literacy

ability assessment is included, and data literacy assessment is included in the overall training plan, process assessment, academic level assessment, graduation assessment and other aspects of the assessment. The specific assessment is implemented by "node assessment + process assessment".

6. Conclusion

The article demonstrates the importance of data literacy in the cultivation of financial talents in the new era, constructs a curriculum system for cultivating data literacy abilities, and proposes specific paths for implementing data literacy through curriculum system construction, curriculum platform construction, integration of curriculum and industry, and curriculum assessment.

References

- [1] Jin Bo, Yang Peng, Liu Juanjuan. Jin B, Yang P, Liu J, et al. Value connotation and generation mechanism of archival data elements. *Archives Science Bulletin*, 2024: 1-17.
- [2] Liu Zhiyan, Wang Qian. The impact of data factors on economic growth: An analysis of mediating effects based on scientific decision-making. *Contemporary Economic Management*, 2019, 1-18.
- [3] Li Wenchao, Jiang Airu. The coupling of "data + capital": the promotion path and risk response of public data asset securitization. *Research on Financial Development*, 2024, 1-10.
- [4] Zhang Xin-Xin, Liu Qi-rong. Three Focus points of high-quality Publishing Driven by new quality Productivity. *China Publishing*, 2024, 1-7.
- [5] Li Pengda, Huang Xin. The Superposition and Multiplication Effect of Releasing Data Elements. *Economic Daily News*, 2024-05-2.
- [6] Ma Yan, Wu Min, Zhang Lu. Research on the impact of data literacy on research innovation ability of postgraduates. *Digital Education*, 2024, 10(02): 16-23.
- [7] Yuan Zhenguo. Historical Turn of Pedagogy -- Reflections on the construction of world-class discipline of pedagogy. *Educational Research*, 2023, 44(05): 4-15.
- [8] Zhao Tingting. University Quality Culture: From qualified quality to Innovative quality. *Educational Research*, 2023, 44(04): 137-147.
- [9] Wu Yinghui. Strengthen the research of Teaching Resources to help the international Chinese education system and the construction of China's international communication System (Acting chair). *Journal of Yunnan Normal University (Teaching and Research Chinese as a Foreign Language)*, 2021, 19 (4): 1-12.
- [10] Yu Haibo, Chen Zongcheng. Interdisciplinary Practice contributes to the cultivation of innovative talents. *Teaching Research of Curriculum Materials (Educational Research)*, 2023, (Z1): 25.