

# From Divergence to Integration: The Dilemma and Reform Rationale of Numerical and Intelligent Financial Talent Training in Universities

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**Abstract:** Under the context of digital economy, financial "data silo" is being replaced by "integrated big data", the penetration of artificial intelligence technology into the field of finance is increasing, and digital intelligence financial talent training is imperative, and the adjustment of university talent training also needs to be followed up accordingly. After analysing both the external environment and internal work changes, it has been identified that the transformation of financial work needs to be transformed and financial training in universities needs to be adjusted. The results of the questionnaire data have revealed three significant "divergent" dilemmas in the process of cultivating digital and intelligent financial talents in universities: the teaching content, teaching process, and teaching force. Therefore, a proposed "integrated" financial and numerical intelligence talent training reform programme includes the integration of "finance" and "numerical intelligence" courses as well as an "industry-academia-research-use" four-pronged approach. This includes an Industry-University-Research-Use "four-in-one" teaching platform, which integrates the teaching process and "speciality, expertise and newness" vocational ability cultivation objectives, along with internal incentives and external faculty introduction system.

**Keywords:** Digital finance; Talent development; Vocational competence; Curriculum integration

## 1. Introduction

In the context of the digital economy, the digital intelligence technology represented by the "Big Intelligence, Mobile, Cloud and Object Area" is penetrating, integrating, interacting and innovating in various industries and professional fields, and gradually forming a new growth force to promote the development of the times. General Secretary Xi put forward in the report of the 20th National Congress, "accelerate the development of the digital economy, promote the deep integration of the digital economy and the real economy, and create an internationally competitive digital industry cluster."

<sup>[1]</sup>Science and technology innovation is people-centred, General Secretary Xi also stressed that "science and technology is the first productive force, talent is the first resource, innovation is the first power, in-depth implementation of the strategy of science and education, talent strategy, innovation-driven development strategy, to open up new areas of development of new track, and constantly shaping the development of new dynamics and new advantages."<sup>[2]</sup>Talents mastering digital intelligence technology are the key and scarce resources for the society in the new era.

Under the new situation, universities are paying more and more attention to the cultivation of talents in digital finance, forming the "Shangcai mode" and "Zhejiang University mode" of the pilot class in the direction of digital finance, etc.<sup>[3]</sup>, and exploring the diversified practice of the curriculum and the teacher team, but how to cross the new curriculum<sup>[4]</sup>, how to cultivate the new vocational ability and how to establish the teacher system are still three major "divisive" problems faced by many universities and need to be solved. How to cultivate new courses<sup>[5]</sup> and how to establish the teacher system<sup>[6]</sup> are still the three major "division" problems faced by many universities and need to be solved urgently, so that the training mode is difficult to achieve the expected effect of talent training, and cannot effectively complete the final teaching objectives.

## **2. Change in the age of digital intelligence as an external driver of finance talent transformation**

The digital transformation of financial professions is a general consensus in both academic and practical circles. The torrent of digitalisation is an inevitable trend of world development and an external driving force for the transformation of financial talents, which directly affects the setting of professional courses, the training objectives and the practical effects of vocational ability cultivation, and provides environmental support for the implementation of talent cultivation.

### ***2.1 The digital economy is driving the trend of financial change***

The digital economy uses emerging technologies such as "Big Intelligence, Mobile Cloud and Object Area" and other emerging technologies, with the help of the Internet carrier, in the form of big data, to promote the transformation of productive forces and relations of production, reshape the economic structure, and change the economic efficiency and competitive pattern of each economy. In the context of the digital economy, financial personnel should not only understand the digitisation of the enterprise, but also understand the impact of digital products in the market, digital finance, etc. on the enterprise <sup>[7]</sup>. Therefore, there is a need for new-age finance professionals to adapt to the development of the digital economy.

### ***2.2 The big data foundation is changing financial perceptions and behaviours***

As early as 2009, Tony Huey put forward the famous new data-intensive knowledge discovery model, that is, "data-intensive" scientific paradigm is emerging <sup>[8]</sup>. While changing the social and economic environment, enterprise economic activities and people's way of life, but also on the management decision-making in the information situation, decision-making body, the concept of assumptions and methods of process and other elements of decision-making has a huge impact<sup>[9]</sup>, as an important part of enterprise management of financial management, big data is also inevitable to promote the cognition of the financial personnel and work behaviour changes such as the above.

### ***2.3 Artificial intelligence technology empowers financial application innovation***

In the field of finance, artificial intelligence technology can assist in the establishment of intelligent early warning systems and assist in intelligent financial decision-making systems, etc., a variety of scenarios, the full integration of artificial intelligence and finance, empowering financial organisations, improving financial efficiency, expanding financial functions, and ultimately realising the value of financial organisations and disruptive innovation.

## **3. Finance progression to the top of the pyramid as an internal driver of finance talent transformation**

The functions of bookkeeping (Record) and disclosure (Report), which are the basics of financial accounting, are gradually being replaced by digital technologies (see Figure 1). Additionally, in management accounting, digital tools are starting to replace human tasks involved in budgeting, cost management, and performance evaluation. However, the application of digital intelligence in advanced financial roles, such as strategic finance and decision-making, remains limited. This is primarily due to the uncertain environmental conditions and the complex, non-routine nature of business strategies, which often involve efforts to enhance internal efficiencies and value through in-depth big data analysis, or through forging strategic business partnerships within the industry to leverage the positive spillover effects of the value chain. Furthermore, the analysis of external financial policies, relationships with financial markets, and institutions, aimed at ensuring efficient financing channels while minimizing capital costs and optimizing capital structure, encapsulates tasks that are challenging to quantify fully. These tasks, which are beyond the traditional scope of financial accounting, represent the most intricate aspects of financial work. They require intelligent tools to support the strategic long-term objectives of a business, integrating external environmental factors and coordinating inter-departmental relationships, while considering dynamic and complex parameters such as feasibility, cost, and adaptability to make optimal decisions. Therefore, the ongoing shift of financial tasks towards the more complex, strategic end of the spectrum serves as a catalyst for the evolution of financial professionals. This transition necessitates a new breed of talent that is proficient not only in traditional financial accounting but also equipped with the skills to harness digital technologies for strategic financial planning and decision-

making.

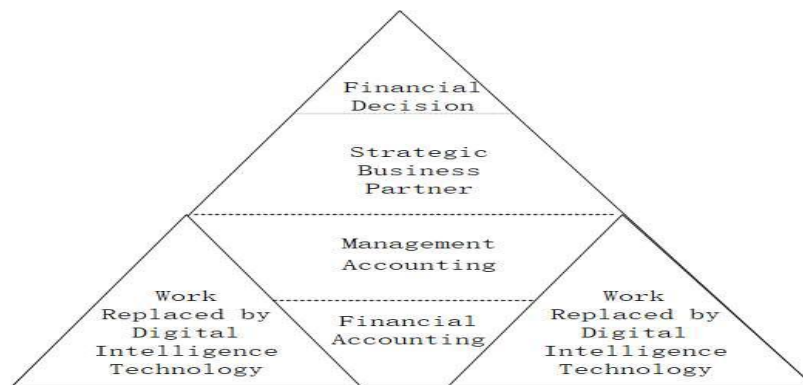


Figure 1: Finance transformation map

#### 4. "Divide" in the training of financial numerical and intellectual talents in universities

The trend of digital intelligence in finance has also been valued by universities, and innovative attempts have been made to cultivate talents, such as the opening of orientation classes, embedded courses or knowledge modules, etc. At the end of 2022, ACCA (The Association of Chartered Certified Accountants abbreviated as ACCA) China Representative Office initiated a research study on the development of digital intelligence in China's universities. Research on Accounting Education, the research collected the viewpoints of those in charge of education reform in universities in the form of questionnaires, and sent out questionnaires to 57 universities, and received 54 valid questionnaires, of which 9 are 985 and 211 universities, and the others are local universities and vocational universities. The results of the survey show that more than 90 per cent of universities have integrated digital finance into talent training to varying degrees (see Table 1), and the vast majority of universities in this process there are three different degrees of significant "division" problems, which constrain the quality and quantity of talent training.

Table 1: Digital Intelligence Finance Integration Talent Development Programme in Universities

typology	Level of integration	No. of units	percentage
1	Establishment of Digital Intelligence Finance Orientation Course	20	37.04 per cent
2	Establishment of the Digital Intelligence Finance Programme	19	35.19 per cent
3	Courses are embedded in the Digital Intelligence Financial Literacy Module	10	18.52 per cent
4	Not embedded yet	5	9.26 per cent

##### 4.1 Divergence in course content

In today's digital transformation, the vast majority of surveyed universities believe that it is very necessary to offer financial digital courses, and a considerable number of universities in recent years have opened courses on digital finance<sup>[10]</sup>, combined with the current digital technology, and timely update the content of the financial accounting courses<sup>[11]</sup>. However, there is considerable disagreement on how the two different types of courses can be effectively connected, complement each other, and conform to the learning rules of students.

##### 4.1.1 The nature of the courses is difficult to unify.

Nearly 60% of the universities that take compulsory courses account for half of each, 22.45% of the universities mainly take elective courses, and 18.37% mainly take compulsory courses. Most of the elective courses are offered in the elective courses of the upper grades, and there is a big difference between whether they can be successfully offered and the number of people who take them, and the nature of the courses is set up to reflect that there is a clear difference in the degree of importance attached by universities to the Maths and Chemistry courses. (see Table 2)

*Table 2: Extent of Numeracy Finance Course Offerings*

Classes in session	percentage
Compulsory Elective 50/50	59.18 per cent
Compulsory course-based	18.37 per cent
Elective-based	22.45 per cent

**4.1.2 Big differences in course content.**

In the research and comparison of universities that have opened smart finance courses, some universities have huge differences in programming languages, some universities open Python, some universities open Java or R language, and there is a huge difference in the schedule of hours, ranging from 32 hours to 64 hours. Programming language courses and the depth of learning vary between universities, and the integration of these courses into the finance profession is one of the difficulties faced by universities.

**4.1.3 The combination of theory and practice is not close**

For digital finance courses to be implemented in application scenarios, theoretical courses need to be supported by corresponding practical training courses. In the interviews, more than 75% of the interviewees' educational institutions offer corresponding practical training content, but only 48% are satisfied with the correlation between theory and practical training, so there is still a clear gap between the financial digital intelligence course and its practical application, and the correlation and logical relationship between them are not clear enough. At the same time, the creation of new courses also means the compression of traditional courses, how to complement each other in a dynamic balance, mutual integration, is the first "division" problem.

**4.2 Divergence in the teaching chain**

For financial digital intelligence, the current academic and practical circles generally believe that the goal of digital finance should be to enhance financial work, better serve the business work and management<sup>[12]</sup>. The teaching process through the planning objectives, organisation and management, assessment and evaluation and other aspects of the gradual completion of the teaching objectives, but in this process there are also differences as follows:

**4.2.1 Diversification of teaching objectives**

Teaching objectives for students' professional competence are more diversified (see Figure 2), with the communication skills of finance personnel and other people inside and outside the enterprise being considered the most important, followed by professional competence, critical thinking, innovation, professional ethics and business acumen, etc., and the objectives of competence training for finance personnel are more diversified.

**4.2.2 Teaching organisation and management focuses on different aspects**

There are obvious differences in implementation among universities because of the differences in teaching plans and various resources. The ZJU model focuses on the cultivation of innovation ability, and students have strong autonomy in the organisation and management of the teaching process; the SFA model focuses on the cultivation of comprehensive ability, and the teaching process is dual-centred between the teachers and the students in the organisation and management of the teaching process; and the SJTU model, which is a more local college or university, focuses on the basic theories and the practical ability.<sup>[13]</sup>In the Southern Examination model, which is a more local university, more emphasis is placed on basic theory and practical skills, and more emphasis is placed on the centrality of schools and teachers in the organisation and management of teaching.

**4.2.3 The difficulty of teaching assessment and evaluation is high**

The assessment methods of the Digital Intelligence Finance and Accounting course are still based on traditional final exams, case reports and group discussion assignments, and the virtual simulation and online platform assessment methods that incorporate modern information technology are fewer. In the teaching feedback link, because of the novelty of the teaching content, coupled with the imperfection of teaching aids resources, the proportion of teachers who think that the course is difficult in the process of teaching is as high as more than 60%, and the satisfaction of teaching is 18% lower than that of the traditional course. The double dilemma of the difficulty of examination and evaluation and the low evaluation will affect the motivation of the teachers and students, and ultimately affect the

teaching effect. (see Figure 3)

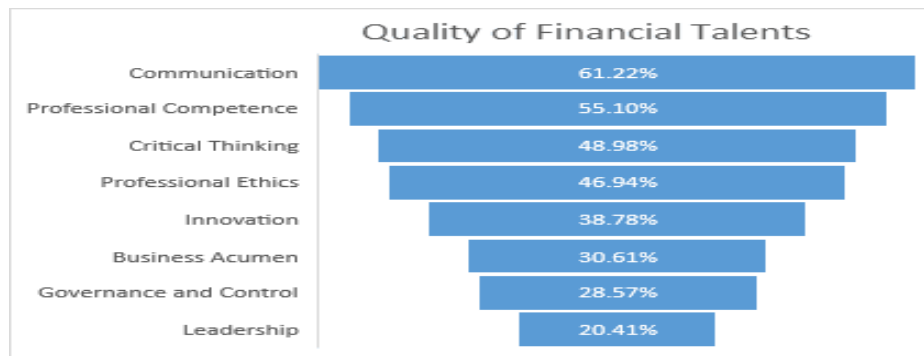


Figure 2: Numeracy Finance Career Competency Map

Proportion Chart of Assessment Methods of Digital Intelligent Finance Courses

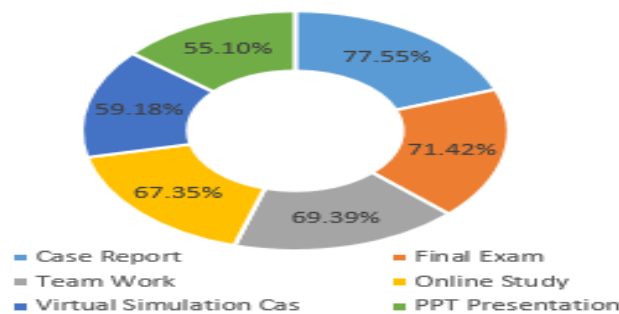


Figure 3: Percentage of Assessment Methods for Numeracy Finance Courses

#### 4.3 Divergence of faculties

As an emerging trend, there is an extreme lack of talent in Numeracy technology, and in a survey of Numeracy financial education issues, 75.51 per cent of universities cited the issue of faculty as the first challenge.

1) There is a lack of digital intelligence finance teachers. universities are the most important institutions for the training of teachers, but the vast majority of universities have only begun to cultivate digital finance talents in the past five years, although some digital finance teachers have transformed from financial information technology or artificial intelligence and other professional directions, but the number of talents is very limited, and the stock and increment of teachers who can undertake digital finance courses are very insufficient.

2) The war for manpower has led to an aggravation of the shortage of teachers. In recent years, enterprises and universities to grab people, universities to grab each other's phenomenon is not uncommon, college and university talent flow and loss of events occur from time to time. The process of robbing people in the treatment of the rising tide, people go higher, the flow of talent to the strength of the stronger or better treatment of universities or enterprises is also logical, thus exacerbating the rise in the cost of teacher manpower, the number of wise financial teachers further shortage of teachers.

3) Insufficient incentives for teaching and research lead to insufficient motivation for faculty transformation. In recent years, the growth trend of high-level scientific research papers published by Numerical Intelligence Finance is obvious, from 20 papers in 2013 to about 130 papers in 2022<sup>[14]</sup>, and the project of scientific research fund is even more obvious, so the emerging Numerical Intelligence Finance faculty have heavy research tasks, and it is difficult to fully take into account in teaching. Incentive policies are seriously insufficient (see Figure 4), 18.52% of universities have a certain amount of additional subsidies, 11.11% of universities have a tilt in title evaluation; 7.41% of universities have a tilt in job evaluation and recruitment; 62.96% of universities do not have any incentives, which restricts the motivation of teachers.

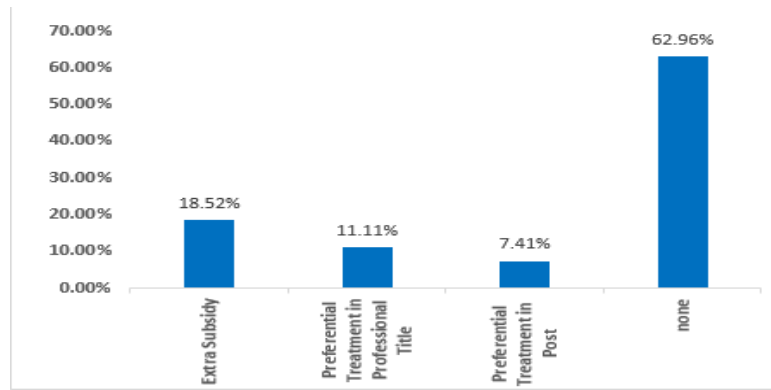


Figure 4: Percentage of incentives for digital intelligence teachers

### 5. "Integration" Reform Rationale for the Cultivation of Digital and Intelligent Financial Talents in Universities

In view of the above "division" problems in the training of digital and intelligent financial talents in universities, we conducted in-depth interviews with the persons in charge of the accounting and finance majors in 14 universities (6 of which have set up intelligent finance majors, and 8 have not yet set up such majors), and put forward corresponding "integration" and "reform" rationales in the light of the results of the interviews. "Reform rationale" is proposed based on the results of the interviews.

#### 5.1 Integration of the content of the "Finance + Numeracy" programme

Deep integration of "finance" + "digital intelligence" courses. At the stage of professional foundation courses, a platform of digital intelligence foundation courses is offered to understand the basic theories and application scope of digital intelligence, and to have certain technical skills of digital intelligence, (as shown in Figure5) such as big data technology, Python language, database management and computer foundation courses. The advanced professional stage focuses on data processing, mining and visual presentation. The advanced professional stage focuses more on the financial application and innovation of digital intelligence, and offers courses related to big data and financial decision-making, blockchain technology, IT auditing and business intelligence, etc. The penetration and sublimation of technology in specific professional fields improve the financial efficiency and decision-making accuracy. In addition, it is necessary to build a four-in-one curriculum platform of "learning, research, use and production". The four-in-one curriculum can be partially divided into related courses or the construction of a special curriculum platform to improve the integration and quality of digital finance courses in an all-round way.

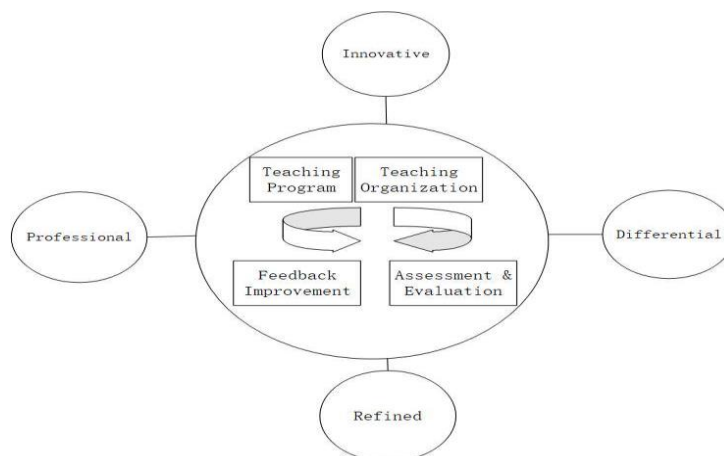


Figure 5: "Finance" + "Digital Intelligence" Curriculum Integration and "Industry-University-Research-Use" Four-in-One Platform Construction

**5.2 Integration of the teaching process with the objective of developing "speciality, speciality and new" vocational abilities**

Combined with the development characteristics of the enterprise path, financial talents can reflect the characteristics of "speciality, speciality and newness", which are integrated into different parts of the teaching process, as shown in Figure 6. In the teaching programme, the core of the professional characteristics of financial talents is still financial theory and business, highlighting "professionalism". In the process of teaching organisation, different universities can differentiate their teaching content and implementation, highlighting "distinctiveness". Comprehensive universities can focus on the comprehensive ability of disciplines, financial universities can highlight the characteristics of subdivided specialities, local universities can combine the characteristics of industry background, and vocational universities can focus on the basic theories and practical skills. Different levels of schooling can also highlight the "characteristics", specialist and on-the-job education stage focus on skills-based financial intelligence talents, undergraduate and master's degree stage to cultivate composite and high-end financial talents<sup>[15]</sup>, master's degree and doctoral stage is committed to cultivating innovative and high-end financial talents. In teaching assessment and evaluation, we strive for "refinement"; in teaching feedback, we encourage "innovation" and encourage students to explore the optimal path to solve problems.

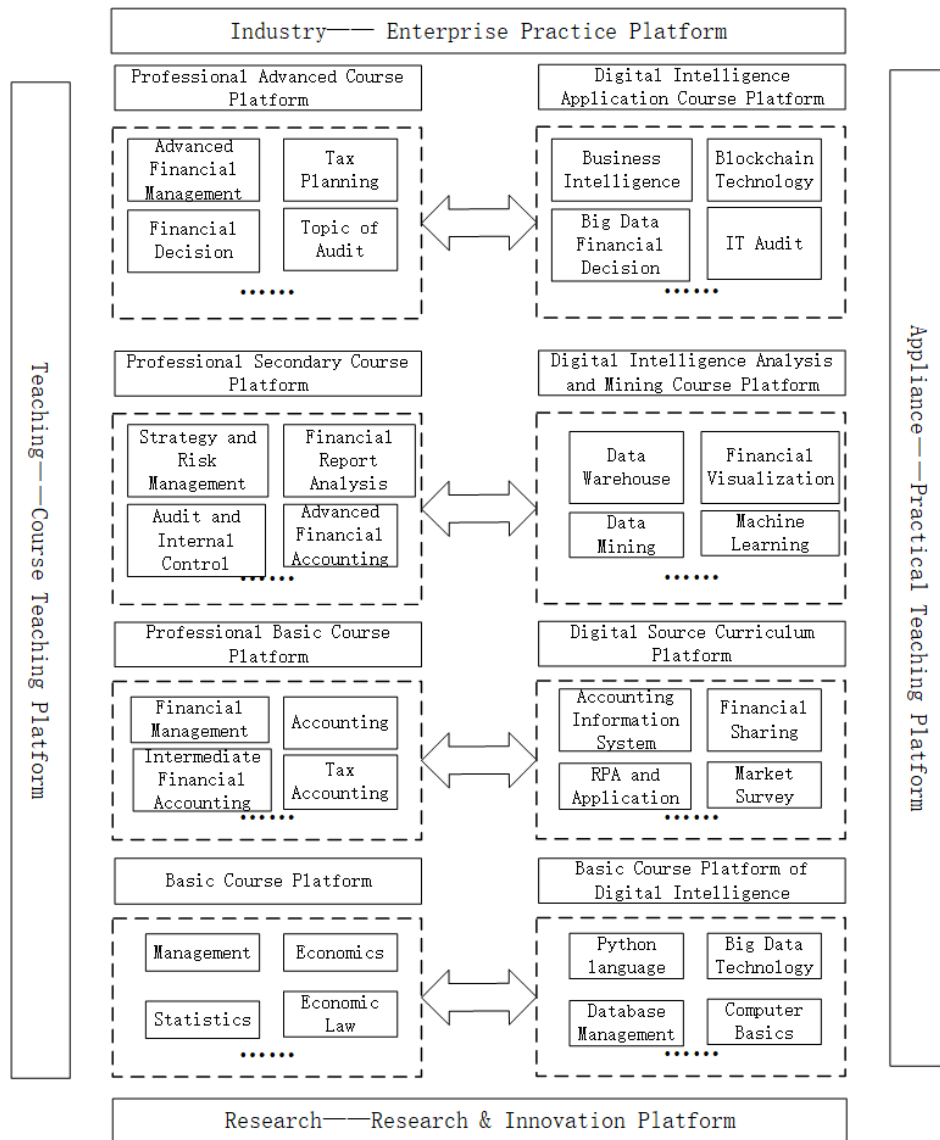


Figure 6: Demonstration of the integration of the teaching process and the development of "specialised, distinctive, and new" financial vocational competencies

### 5.3 Aggregation of internal incentives and external faculty induction systems

Most of the AI education in China is limited to the field of engineering disciplines, and there is less integration of humanities and social sciences with AI. There are also not many teachers with interdisciplinary background in the faculty. To integrate the existing faculty in an all-round way, for the teachers who are responsible for the traditional mathematics and intelligence courses, through the intersection of the basic content of the taught courses and the professional content of the finance courses, they can form the "dual-teacher" faculty in different faculties and departments, so as to cultivate and share them in both directions. For externally imported faculty, the existing conditions of importation can be raised while the corresponding conditions of importation can be relaxed, such as professional background, age or academic qualifications. In addition, multiple sharing of faculty should be realized. The collaboration between enterprises and universities facilitates the sharing of faculty and financial resources, enhancing the level and ability of financial numeracy through school-enterprise partnerships. This initiative encourages a reciprocal improvement in financial literacy skills. Additionally, there is an emphasis on co-promotion among numeracy faculty in both teaching and research. This strategy aims to motivate faculty specializing in finance numeracy to mutually support each other's advancement in teaching methodologies and research endeavors. Through the internal and external aggregation of the faculty building system, it empowers the enhancement of the level of financial education in digital intelligence.

## 6. Conclusion

Apart from the above three major issues, there are also the issues of teaching resources, school-enterprise co-operation and industry exchanges, which also require attention. First, the development of high-quality teaching resources, such as the development of online public digital finance teaching courses, the publication and distribution of digital finance teaching materials and teaching aids. Second, the deep cooperation between universities and enterprises for collaborative education. Relying on the brand endorsement of universities and enterprises to achieve joint training of students' school-enterprise co-operation to create a smart financial industry college, universities to serve the community, enterprises to order the training of required talents, the integration of industry and education. Third, industry exchanges and common improvement, different levels of universities through the exchange of experience and resource sharing, in the digital intelligent financial talents training differentiated training at the same time highlight the characteristics of schooling, common progress and improvement, to meet the social development of digital intelligent financial talents rising demand.

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## References

- [1] ZHU Xiaojun, XU Xuanxuan. *Research on the cultivation path of intelligent financial talents based on the integration of industry and education [J]. Accounting Newsletter, 2022(21):172-176.*
- [2] JIN Qinglu, ZHU Kai, ZENG Qingsheng. *Exploration and practice of the "Shangcai model" for training financial talents in the era of digital intelligence [J]. China University Teaching, 2021(11):28-34+45.*
- [3] Chen Jun, Dong Wang. *Intelligent Finance Talent Cultivation and Exploration of Zhejiang University [J]. Finance Monthly, 2021(14):23-30.*
- [4] SHU Wei, CAO Jian, WANG Hua, ZHAO Bowen. *Status quo, challenges and countermeasures of undergraduate accounting talent training in China [J]. Accounting Research, 2021(08):177-189.*
- [5] WANG Hua, CAI Xiang, ZHANG Chengrui, LIU Shanmin, CHEN Ming. *Layered construction of*



- competency framework for accountants in the Internet era [J]. *Finance Monthly*, 2021(02):16-24.
- [6] Wang H, Liu Shanmin, Zhang Chengrui, Cai Xiang, Chen Ming. 2019 Competency Framework for Accountants in the Internet Era. *Research Report of the Chinese Accounting Association*.
- [7] Lu Guanchen. Cultivation of financial innovation talents in the context of digital economy: concept, path and evaluation [J]. *Finance and accounting newsletter*, 2023(08):171-176.
- [8] Viktor Mayr Schönberg, Kenneth Kukier. *The age of big data: The great transformation of life, work and thinking*[M]. Sheng Yangyan, Zhou Tao, Translation. Hangzhou: Zhejiang People's Publishing House, 2013.
- [9] Chen Guoqing, Zeng Dajun, Wei Qiang et al. Decision-making paradigm shift and enabling innovation in big data environment[J]. *Management World*, 2020, 36(02):95-105+220.
- [10] XU Yude, LIU Di, FAN Kexin. Transformation of accounting education and career development planning in the era of digital economy [J]. *Financial Science*, 2021(12):27-36.
- [11] WEN Su-Bin, WEN Hao-Ran, ZHANG Xing-Liang, LI Hui. Listening at the same time is clear: A survey study and programme design of intelligent accounting talent cultivation [J]. *Accounting Monthly*, 2023, 44(01):81-86.
- [12] HU Renyu, LIU Qin, QIU Muqing, HUA Guiru, XIONG Yan. The development leap from computerisation to intelligence - A review of the main points of the 20th National Accounting Informatisation Annual Conference [J]. *Accounting Research*, 2021(10):190-192.
- [13] Liu Meiling, Huang Hu, Tong Chengsheng, Liu Kai. Research on the basic framework and construction idea of intelligent finance [J]. *Accounting Research*, 2020(03):179-192.
- [14] Cai Xianjun, Chen Qingrong, Wen Subin, Wang Jingyong. Reform and Practice of Intelligent Accounting Talent Cultivation under the Background of New Liberal Arts--Taking Nanjing Audit University as an Example [J]. *Friends of Accounting*, 2022(03):135-140.
- [15] Yufeng Jiang, Xiayu Li, Shaoyu Jiang, Aimin Chang. Research on the reform of accounting talent training under the trend of financial intelligence [J]. *Finance and Accounting Monthly*, 2022(13):94-101.