

IT Audit Education Implemented Under the Cloud Accounting

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Abstract—Digital economy requires the ‘new’ auditor who should not only master the traditional knowledge and methods, but also embody technology-oriented ability. Facing the change of labor market demands, our school has put forward a new engineering model of IT audit education. Based on the CDIO engineer concept, this paper proposed a new conceive of IT audit cultivation. This IT auditor talent training mode sheds highlight with multidisciplinary integration and university-enterprise cooperation. Taking the practice of the engineering audit talents model in our university as an example, we cooperated with the industry to build a projected-oriented practical IT audit courses on the basis of the current demand and situation of the talent training. Besides, curriculum is integrated with the big data and other technology courses with blended-learning teaching method, which provides a new path for promoting the development of IT audit education. This research can provide guidance for IT audit talent training mode under the new cloud accounting age.

Keywords—IT Auditing; CDIO; Blended Learning

I. INTRODUCTION

In the recent years, technical breakthroughs (especially for big data, AI and cloud share) have unprecedented improved the ERP system and the whole society have emphasized the focus of the data computing and data mining, which has significantly influence on the accounting and auditing practice. Information technology (IT) is pervasive in the business activities and large volumes of trades and transactions are virtualized and stored as structure or unstructured data in the information system(IS). As an important tool of corporate supervision, audit should be inevitably integrated with some information technology to mine and analyze financial data in order to test the ‘new’ errors and frauds. In addition, the modern audit also should consider the risks of the ERP information system. Information technology audit (IT audit) is born in the response to this digital times.

IT audit is the process of collecting and evaluating evidence to determine whether an accounting information system has been designed to safeguards assets, maintain data integrity, achieves organizational goals effectively and consumes resources efficiently [1]. Generally, it contains two parts: (1) auditors apply the appropriate computer technologies to assist them in auditing, namely, Computer Assisted Audit Technologies (CAATs), which is our audit focuses right now; (2) auditors’ core objects are information systems (IS) and

technologies that the companies has employed, referred to as Information Systems Auditing (ISA), seen figure 1 below.



Fig. 1. Contents of IT audit

IT audit requires the auditors that not only grasp the economic management as the core point but also should have the sound foundation of the software, hardware, development, operation, maintenance, management and security of the information system. Therefore, IT auditors can make usage of standard and advanced audit technology to audit, test, evaluate and improve the security, stability and effectiveness of the information system [2]. The shifts of auditors’ abilities require substantive changes in audit education, which will bring the IT science into the traditional management subject. Audit students have to master the traditional audit knowledge and methods, but also embody technology-oriented ability. For example, in particular accounting and auditing course, the way of digital data collection and process will increase the statistical and IT content in curricula.

Based on the CDIO, this paper put forward a new engineering model of IT audit education. Firstly, the paper briefly introduced the meaning of this paper. Secondly the field investigation on the demand of the labor market are taken to understand the current social evaluations and expectations for audit students and revise the objectives of IT audit students’ cultivation. The paper then constructs the training framework for the IT audit talents and sheds highlight on the IT auditor talent training mode with multidisciplinary integration and projected-oriented courses due to the university-enterprise cooperation, which provides a new path for promoting the development of IT audit education. The last is the conclusion and hope that this research can provide guidance for IT audit talent training mode under the new cloud accounting age.

II. CURRENT SITUATION OF AUDIT LABOR MARKET AND EDUCATION

Facing the change of the audit business, audit talents in the labor market has been shifted quickly. The explosive growth of IT capabilities has led to a dramatic increase in the use of IT system to originate, process, store, and communicate information. In this part, we investigated the current labor market demand for IT auditors and also made a survey of current audit education situation to assess whether the current cultivation can meet this shift of market demand.

A. The Investigation of Market Demand of IT Auditors

With the penetration of information technology into various industries, the audit work has been increasingly showing the characteristics of systematization and complexity. From 2011, the institute of internal auditors (IIA) has focused on the application of data-oriented CAATs in audit data analysis [3] and also issued the "understanding and auditing big data" guide to IT auditors in 2017. In recent years, many governments have proposed to establish audit information system with big data as the core, aiming to realize full audit coverage [4]. To accelerate the construction of audit information, auditors should enhance the abilities of data analysis, expand the use of big data technology, and greatly improve the ability to use IT to find problems, evaluate and judge, and conduct macro analysis. Auditors is required to expand the knowledge structure of auditors from finance and economics to multi-disciplinary fields including computer science, engineering and law [5]. The proportion of IT business has been greatly growing while the traditional financial audit services has been decreasing in the current practices [6]. In order to satisfy the increasing needs of enterprise internal control risk and inherent risk assessment of the business, many firms set up the IT audit department. The main duty is to monitor the customer's information system risk and operational risk, to control of computer environment risk and information system operation risk and to provide consulting and training of ERP. Therefore, the demand of IT auditors has been more and more urgent.

B. The Investigation of Current Auditing Education

Facing with the ever-changing information environment, universities as the first line of auditing education, should timely adjust the existing teaching mode and curriculum system to meet the training needs of application-oriented and interdisciplinary IT audit talents in the new market. However, the investigation does not show the optimistic results.

After investigating 35 universities in China, we find that auditing courses in most universities still stays in the traditional knowledge teaching without combining any theories with IT. A little of universities construct the IT audit teaching curriculum system but facing the problem of interdisciplinary complication. Generally speaking, the IT audit teaching system includes management course group, accounting course group and IT course group and it is difficult to achieve effective parallelism and integration among different groups. In addition, the interdisciplinary IT audit courses rise up the requirements of professional teachers. Only little traditional audit teachers can meet the requirements of IT ability and the teacher resource deploy among different schools is relatively complicated. The

practical platform of audit teaching is limited by using EXCEL. The lack of audit training environment for large-scale dynamic data collection and analysis makes it difficult to train students' comprehensive quality and ability to use big data thinking in dynamic information environment.

Meanwhile, traditional 'lecture' is still the main teaching mode. A follow-up survey is done from 2018 to 2019 on the effect of audit teaching in the financial management department of our university. 48% of the students thought they understood, but did not know how to use it. Only 6.3% showed an interesting in it. Over 90% of the students' learning objectives is passing the exam or taking the CPA, but 82% of the students still didn't know how to prepare the CPA after learning. This teacher-centered lecture mode emphasizes theory over practice, which eventually leads to too little information being transmitted in class and severely inhibits students' thinking ability.

Therefore, IT audit curriculum system should focus on the combination between the audit theory and practice with highly integration of the IT course. It is important to design an interdisciplinary IT audit learning scheme, emphasize the project-based teaching method and improve school-enterprise cooperation, so that we can train our students with innovation ability, practice ability and flexible application ability of knowledge. In the following part we introduced our implementation experience on the IT audit talent cultivation based on CDIO engineering method.

III. IT AUDIT ENGINEERING EDUCATION MODEL BASED ON CDIO

The idea of CDIO engineering education exactly provides the relevant assists in new accounting talent training. CDIO, namely, Conceive, Design, Implement, and Operate is a comprehensive value-added engineering education system, which is one of the most famous engineering education reform conceive in recent years. It is highly summarized and expressed the concept of 'learning by doing' and 'project-based education and learning'. It also embodies the abilities system that modern engineers should conduct the working process beginning from conception, to design, to implement lastly. These abilities include not only professional skills, but also personal and interpersonal ones, such as communication and creativity in the process.

A. Conceive: Target of IT Audit Engineering Education under Cloud Accounting

Auditing is a strong practical subjects, in the context of the 'cloud accounting', it is necessary to cultivate accounting graduates with comprehensive professional knowledge at the same time with the strong IT and data science application ability to catch up in the line with the demands of future economic and social development. Based on the traditional training mode, new IT audit talent training mode should take fully designing of the data mining and analysis abilities to reconstruct the IT audit interdisciplinary integration cultivation model.

This integration results in the traditional management subjects with a certain degree of engineering properties, which

makes CDIO engineering practical education training idea feasible and suitable. In order to cultivate interdisciplinary IT auditors, our financial management department of Dalian Neusoft University of Information has studied the core of CDIO engineering education, combined the engineering advantages of the university to propose the CDIO characteristic IT audit education mode. The cultivation target is set to train competitive students with compound auditing knowledge hierarchy and IT practical ability under cloud accounting.

B. Design: CDIO abilities of IT Audit Engineering Education

In the CDIO engineering education concept, the abilities index system is set up based on the cultivation targets and then provides the guidance for the implementation. Considering the industry, social and academic sectors, the index are chosen circling around the two questions 'what kind of engineer should we train', and 'how to cultivate the engineer'. Both of these topics emphasize the specific characteristics that each engineering graduates should be able to be. Based on the industry investigation, the demand for audit vocational ability includes professional knowledge, comprehensive analysis ability, continuous learning ability, expression and communication ability, team spirit, foreign language, decision-making ability, scientific research ability, etc.

The arrival of the 'cloud' era further endows auditor with new challenges, computer application ability. With the acceleration of the application of cloud accounting, the traditional IT audit mode has been further transformed—from the system centralized processing mode to the cloud decentralized processing mode, which means that data mining and data analysis IT abilities are clearly new requests for the auditors. Based on above analysis, our department remodels the talent training ability index, the new interpretations and focuses are given on ability index system. The main changes are shown in table I.

TABLE I. RECONSTRUCT OF CDIO ABILITIES SYSTEM

No.	CDIO Ability index	Changes
1	Technical knowledge and reasoning	Increase the importance of IT knowledge and engineering science knowledge; Processing ability to the unstructured IT data mining and analysis abilities;
2	Open thinking and innovation	Highlight the interdisciplinary courses and knowledge Integration abilities.
3	Personal and professional skills	Shift financial indicators analysis ability to the abilities of forecasting, decision-making and risk control; Enhance the competitiveness by life-long learning new technologies.
4	Social contribution by application practice(CDIO)	Industry IT application ability to conduct system design, develop, and control.

C. Implement: Interdisciplinary Curriculum for IT Audit Engineering Education

Scientific courses are the key implementation to cultivate students' ability. Under the cloud accounting, compound talents training calls for the integration of curriculum. Figure 2

shows interdisciplinary integration for the subjects and course supports from relevant schools, which make the integration system feasible.

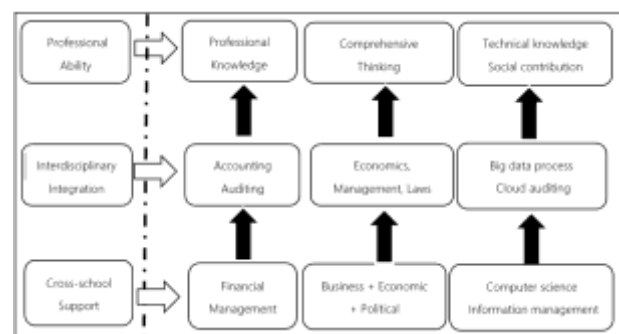


Fig. 2. Interdisciplinary integration map

Traditional accounting and auditing courses are regarded as the base for students to study and focuses on promoting students' proficiency in professional theories and their cognition of linking theory with practice, so as to form a more systematic auditing knowledge framework and lay a solid foundation for the later IT combination. Economic and managerial theories integration enlarge the horizons of the students to train the ability of comprehensive thinking. Last, in order to compete in the informatization age, IT is not only the teaching assistant instruments but also should well formally involved in the courses. Traditional accounting educators lack the IT knowledge reserve, which makes the informatization education unrealistic. Under the new talent training mode, IT integration is feasible through platform courses and interdisciplinary teaching resources construction. In the implementation of our informatization courses, it fully expresses the characteristics of highly IT integration with profession, shown in figure 3. Through the set of core and electives courses, it systematically covers all the technologies and methods that IT auditor needs. Practical courses are also designed to apply the IT theory to the accounting practice based on projects-solving.

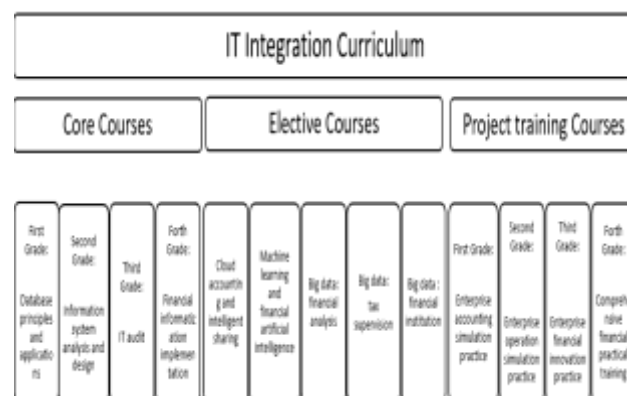


Fig. 3. IT integration curriculum

D. Operate: CDIO Based IT Audit Talent Training Mode

The last, operation is the linkage throughout the whole IT audit talent training mode, and it is also seen as the test of the

conception, design, implementation and other contents described above for the mode. CDIO initiative is mapped to our curriculum system, specific in each course, topic, project and innovative practical activity. The progressive IT audit talents training mode is built for undergraduates through four year's study, which is integrated with the practice training resources both inside and outside campus seen as Figure 4 below. The mode stresses on the projects-based education and trains the talented practicability based on the university-institutes cooperation.

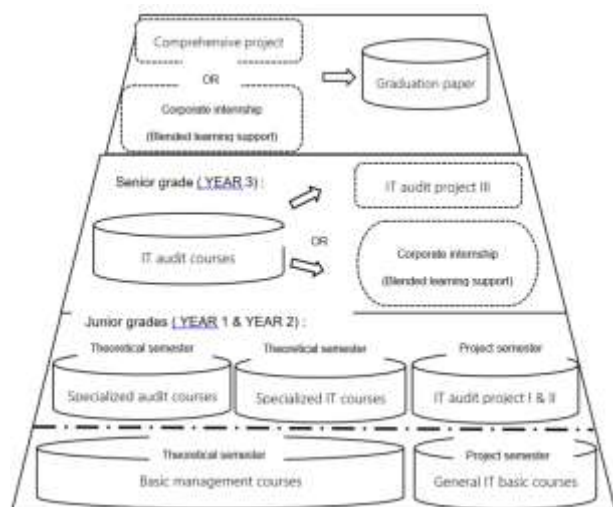


Fig. 4. CDIO based IT audit talent training operation mode

IT audit education reform aims to cultivate practical and IT composite talents to face the age of cloud accounting. Students not only should lay the solid foundation on the financial academic knowledge, but also can be practical to extract and analyze the data to make the strategies of the forecasting, managerial control and provide IT service. In order to realize our target, '1+3+2+1' learning system is establishing. That is, '1' academic year is divided into '3' semesters, '2' theoretical semester and '1' project semester. The progressive curriculum is designed to help students master the professional knowledge, while, projects train students IT (Excel, Python, SAP HANA) application ability. All the courses and project is supported by blended-learning platform that allows students to integrate online/offline learning within a broader range of more traditional learning techniques. Our online/offline blended-learning recourses includes MOOCs, case libraries, project libraries, assignment libraries, and so on, which flexibly backups students to study at any time in- or out-campus. In the senior years, student is instructed to achieve related certifications by the in-campus project training or participate in authentic training as dispatched internship in the collaborative corporates.

Our academic training keeps well interaction with the cooperative enterprise, which creates win-win benefit for both sides. In-campus practice resources mainly refer to our IT audit university-enterprise united laboratory. There are abundant

training schemes, projects and optimizing application system, which provides volumes of training materials for senior students to close to the distance from the school to enterprises and improve education quality. Out-school practice base provides the internship chance supported by our cooperate companies. Students can improve their knowledge, ability and quality in the real enterprise environment. By integrating the practice resources, students are first trained in the school-enterprise joint laboratory for simulation project training, and then internship in the enterprise so as to cultivate students' practice ability. The jointly laboratory provides a friendly audit training environment for large-scale dynamic data collection and analysis and practice bases timely feedback the market and student data to adjust talent training mode. Enterprise-university collaborative education establishes a more scientific, reasonable, sustainable talent training mode, which can guide the future curriculum system optimization.

IV. CONCLUSION

Confronting the quick technique revolution and multidimension changing auditing industry, it is a pivotal question on how to training our talents with compound abilities and competitiveness. As the coming of cloud age, society already requests the new demands of audit talents who should not only have comprehensive professional skills but also own the IT data processing ability. It is urgent for audit education to reform and cultivate IT composite talents nowadays. In this paper, it provides a feasible suggestion to reconstruct IT audit mode. Base on CDIO, the paper indicates the cultivation of compound IT auditor and emphasizes the establishment of interdisciplinary integration curriculum. Traditional courses should be well integrated with IT courses corresponding to the changing society. By adopting engineering project-based education simultaneously enterprise internship, this talent training mode strengthens the students' practical ability. Through the unremitting efforts to do the practical exploration and implementation, IT audit engineering education mode will be able to cultivate undergraduates to become professional and IT auditors to well compete the new business world.

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