Discussion on the Construction of Information Management and Information System Course under the Background of a New Generation of IT

Yonghua Guo\textsuperscript{1,a} and Changbin Jiang\textsuperscript{2,b}

\textsuperscript{1}School of Management, Wuhan University of Technology, Wuhan, Hubei, China
\textsuperscript{2}School of Management, Wuhan University of Technology, Wuhan, Hubei, China
\textsuperscript{a}gyhlearning@163.com, \textsuperscript{b}13018084963@163.com

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Abstract. The new-generation information technology represented by the Internet, cloud computing, big data and artificial intelligence has become the mainstream trend in the IT field. The development of the times have changed the direction of enterprises' demand for talents in information technology. The purpose of this article is to study the training objectives and curriculum reform of Information Management and Information System of typical universities under the context of new-generation information technology, to provide experience and referential suggestions for the construction of current Information Management and Information System major in China.

1 Introduction

With the popularization of the Internet, the informatization of enterprise has gone through the stages of production automation, management informatization, and network integration \cite{1}, realizing the construction of information system and intelligent applications. Since the State Council of China issued the "Outline of Action to Promote the Development of Big Data" in 2015, the new-generation information technology has continued to penetrate deeply into the real economy such as manufacturing, finance, healthcare, logistics, communications, and transportation. The informatization of Chinese enterprises is moving towards the direction of deeper analysis and mining of big data, in the meanwhile, enterprises have put forward higher competence requirements for technical talents, which has brought crises and challenges to the Information Management and Information System major. The curriculum reform of the Information Management and Information System is imminent.

After more than 20 years of development, China's Information Management and Information System major has become increasingly mature. As of 2018, there have been 434 establishments in China \cite{2}. Colleges and universities of different nature have formed their own distinctive training modes according to their college background, cultural connotation, school running characteristics and social needs, such as technology orientation, management orientation, and information resource management orientation, etc. This article refers to the list of dual first-class disciplines released by the Ministry of Education of China in September 2017 and the results of the fourth round of national discipline evaluation, selecting Renmin University of China, Tianjin University and Wuhan University which is the typical domestic iSchool institution according to different oriented training models. The purpose of this article is to provide diversified ideas for the construction of undergraduate courses of Information Management and Information System major with distinctive characteristics.
2 The Status of Information Management and Information System Course:

2.1 The scope of the course is too broad and the orientation is vague

Information Management and Information System has an interdisciplinary nature, and its curriculum system includes economics and management, information management and information systems, computer science and technology [3], covering a wide range of knowledge areas. Some universities are overly pursuing the construction of students’ composite interdisciplinary knowledge system, so they have opened a large number of courses in various directions, such as financial accounting, e-commerce, and logistics management, which can easily lead to the loss of the direction of the major, and become a simple collection of disciplines rather than a fusion.

2.2 Low degree of curriculum relevance and integration

According to the basic competence requirements of Information Management and Information System, the courses can be divided into technology of application, information system, and knowledge of other fields [4]. Knowledge of other fields are characteristic directions to be oriented by universities. Technology of application and knowledge of other fields constitute the professional level of Information Management and Information System, cultivating the skills of computer application and the theoretical thinking modes. Information system should cultivate application ability including system analysis and design, information organization retrieval, and project management. However, the relevance of knowledge offered by some colleges and universities does not closely match [5], resulting in the fragmentation of knowledge during the cultivation process, and also leading to a decline in the teaching effect of subsequent comprehensive courses in information system. Some colleges that combine information technology and management but focus on technology set computer-related courses in the early stage and relatively simple management courses in the later stage. The differentiated curriculum will make students focus on technology and ignore management methods, or focus on management and ignore technology, and it is difficult to achieve organic integration of multi-disciplinary.

2.3 Curriculum updates are slow and cannot keep up with the times

By investigating the training programs of this major, it is found that most of curriculum systems are currently being updated slowly, the theoretical teaching is lagging behind the technology development and practical application [6]. The requirements for ability are limited to the level of cognition of cutting-edge technology. Although some colleges and universities have established relevant courses, these courses have not integrated with the training direction of Information Management and Information System, which has reduced the teaching effect.

3 The Curriculum System of Typical College

3.1 Technology-oriented curriculum

Information Management and Information System major of Renmin University of China is established in the School of Information. Since 2009, the School of Information has implemented a large-scale training mode of "science experiment classes", mainly training cross domain talents who have a solid foundation in mathematics and computer science technology, and can engage in the development, application, management, modeling and analysis of computer and information systems in various fields. The professional course system consists of three basic courses: basic subject courses, professional compulsory courses, and professional and inter-professional elective courses. The professional credits in Information Management and Information System major is 90, the credits of basic subject courses and the credits of professional compulsory courses account for 50% and 27.7% of the professional credits respectively. These two types of courses realize the cultivation of students' mathematical ability and comprehensive development and application of information systems.

The credits of professional and inter-professional elective courses account for 22.2% of the professional credits. This type of courses is divided into two categories: theoretical and applied courses category and development directions courses category. According to the requirements of the
professional training program, the Information Management and Information System major needs to complete certain elective credits in two small categories of theoretical and applied courses, which are the computer theory and technical basics category and information in the theoretical and applied basics category; the development directions courses of the School of Information include 14 modules, covering economics and finance, system development, management applications, network technology, software engineering and other fields, including the current information combining cutting-edge modules such as artificial intelligence, data management, and information security cores. The Information Management and Information System major needs to complete certain elective credits in three limited modules: management application, e-commerce, and information system development. The remaining credits are free to choose.

3.2 Management-oriented curriculum

The management science and engineering of Tianjin University was selected as a "double first-class" construction disciplines, and ranked second in the country in the third discipline evaluation by the Ministry of Education. Its second-level discipline of Information Management and Information System is opened in the College of Management and Economics, mainly cultivating senior compound talents with the ability to analyze data, manage information technology projects, and use information technology for management innovation and business model innovation. The curriculum system of this major includes management-oriented subject basic courses, professional compulsory courses, and professional elective courses focusing on extended technical. The main courses are shown in Table 1.

| Course Category          | Course Title                                                                 |
|--------------------------|-----------------------------------------------------------------------------|
| Subject Basic Course     | Financial management, economics, management, business operation management, applied statistics, operations research, etc. |
| Professional Compulsory Course | Database principles and technologies, computer networks, databases, information system construction, data structures, etc. |
| Professional Elective Course | Computer hardware and integration, system software principles and other technical courses and business data analysis, Python and network data acquisition, data warehouse and data mining, etc. |

3.3 Information resource management-oriented curriculum

The iSchools are committed to researching the relationship between information, technology and people [7]. The School of Information Management of Wuhan University is the first development member of iSchool in China. The Information Management and Information System major established in this school follows its philosophy and is guided by information resource management. It not only trains information management talents mastering the basic knowledge of computer and information systems, but also attaches more importance to information literacy, information organization, searching and application level of talents. The School of Information Management adopts a social science experimental class model. Under this model, courses are divided into three types: platform courses, professional compulsory courses, and professional elective courses. Professional compulsory courses include a large number of information courses, focusing on the cultivation of students' information service capabilities. For the cultivation of service ability, the college provides more elective courses, including courses in programming technology, mathematical knowledge, big data, economics and finance, etc. The main courses are shown in Table 2.
Table 2. Information Management and Information System Courses in Wuhan University.

| Course Category       | Course Title                                                                 |
|-----------------------|-----------------------------------------------------------------------------|
| Platform Course       | Principles of Management, Basics of Information Management, Python Language, Information Organization, Information Retrieval, Information System Analysis and Design, etc. research, etc. |
| Professional Compulsory Course | Linear algebra, data structures, computer networks, information services and users, applied machine learning, intelligent information systems, information metrology, etc. |
| Professional Elective Course | Java language programming, financial management, user experience design, information economics, business decision models, big data analysis, data mining, information system project management, artificial intelligence, etc. |

4 Characteristics of the Curriculum System Reform of the Information Management and Information System Major in Typical Universities

4.1 Renmin University of China

Through research on the professional training programs of Information Management and Information System from 2015 to 2017, we can find that there is only computer theory and technical basics category in the theoretical and application basic category from 2015 to 2016. The latest training program expands information in the theoretical and applied basics category in the training program of 2017, cultivating thinking patterns of information resource management and integration, and introduces business data analysis into professional compulsory courses. In the elective course groups, the previous Python program design course was changed to Python data analysis course, and the programming of e-commerce system course was changed to the innovative mode and system implementation of e-commerce course. The professional compulsory courses and professional elective courses are moving towards the direction of data analysis. The reform of this school's curriculum system has made a more detailed division of the curriculum direction, and adjust the curriculum in accordance with mainstream development technology and social needs.

4.2 Tianjin University

The professional training program of Information Management and Information System in this school has 2015 and 2018 versions. In the latest reformatory program, the subject basic courses and professional compulsory courses have only slightly changed, but new data analysis category such as business data analysis, Python and network data acquisition, data warehouse and data mining have been added into professional elective courses, focusing on the training of the ability of analyzing data.

4.3 Wuhan University

The professional training program of Information Management and Information System in this school has 2014 and 2018 versions. Comparing the 2014 version with the 2018 version released in April 2019, we can find that the college adopted a social science experimental class model and changed the previous C language course to the mainstream programming Python language course. Text understanding course and data mining course, applied machine learning course are added to professional compulsory courses, and courses in some knowledge areas such as big data, finance, and management that are closely related to information processing are provided in professional elective courses, such as data mining course, business decision-making course, information economics course, etc. This form achieved the integration of new IT technology and professional orientation. Under the guidance of information resource management, the new training program has weakened the requirements for economic management knowledge, strengthened requirements for students' technical capabilities and information processing capabilities. The new professional training program is more in line with the needs of society for top talents.
5 Suggestions on the Construction of the Domestic Information Management and Information System Course System

5.1 The major of Information Management and Information System should have a clear positioning, and make the curriculum settings fit the training positioning.

The technology-oriented major of Information Management and Information System can focus on cultivating students' solid mathematical and technical skills. In the professional elective courses, management and application directions can be provided for students to choose freely. At the same time, a modular course with a clear direction and a cross-disciplinary curriculum system can be set up, which is conducive to students' clear development direction and positioning.

Management-oriented major of Information Management and Information System can provide the necessary management courses in subject basic courses. At the same time, they should pay attention to the important role of technology in management, and train composite talents with the capabilities of management, technical, and data analysis.

Information resource management-oriented major of Information Management and Information System should focus on the gradual cultivation of students' information thinking and corresponding technical capabilities. Basic information courses should be established in platform courses. In the professional compulsory courses and professional elective courses, information courses should increase the difficulty and depth in order to build a complete information thinking knowledge framework for students through a coherent curriculum system.

5.2 The curriculum should grasp the needs of society and enterprises in time and keep pace with the times.

The technology-oriented major of Information Management and Information System can expand the skills of students in big data and data analysis area and strengthen the difficulty of technical courses and training students' practical skills to meet the needs of enterprises.

Management-oriented major of Information Management and Information System can provide data analysis courses that combine enterprise management in professional elective courses, deepening students' core technical capabilities. It also should expand the boundaries of this major and cultivate data analysis capabilities based on actual needs in the application of information systems, achieving the purpose of using strong information technology and data analysis to support management.

Information resource management-oriented major of Information Management and Information System must not only make the difficulty and depth of information courses meet the needs of employers, but also provide information processing courses combined with big data, finance, and management to improve students' ability to process complex information.

5.3 The curriculum system should add more practical courses and links

The practical teaching is an important link in cultivating students' ability to turn theory into practice. Information Management and Information System major can set up experiments in technical courses such as programming course, computer network course, operating system course, and database principles course to train the technical ability of students. Management information system, information system analysis and design courses should be set up design experiments to cultivate students' comprehensive ability, so that students can master the ability of system planning, system design and system maintenance.

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