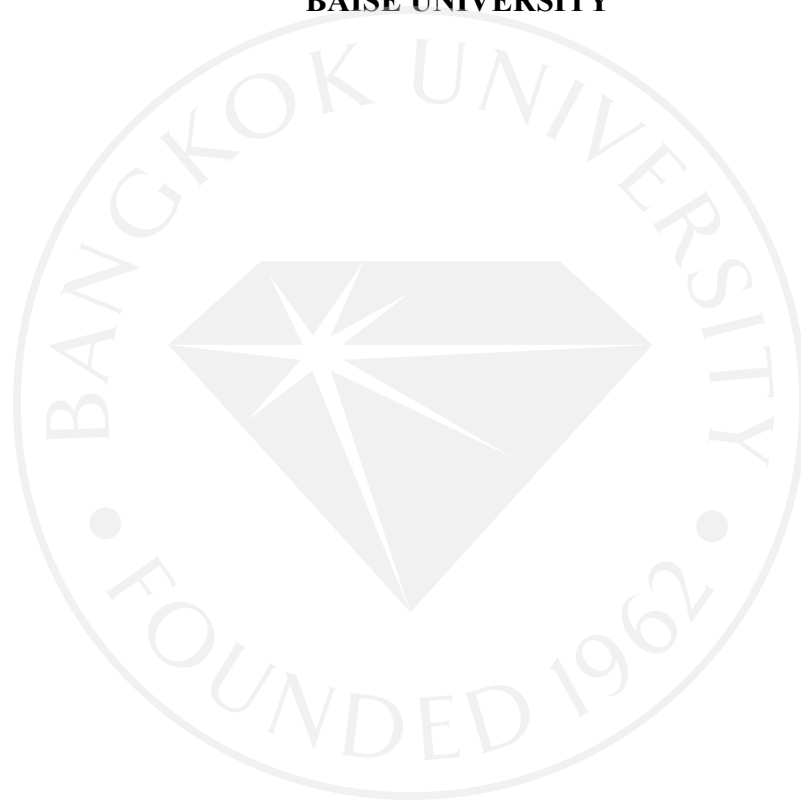
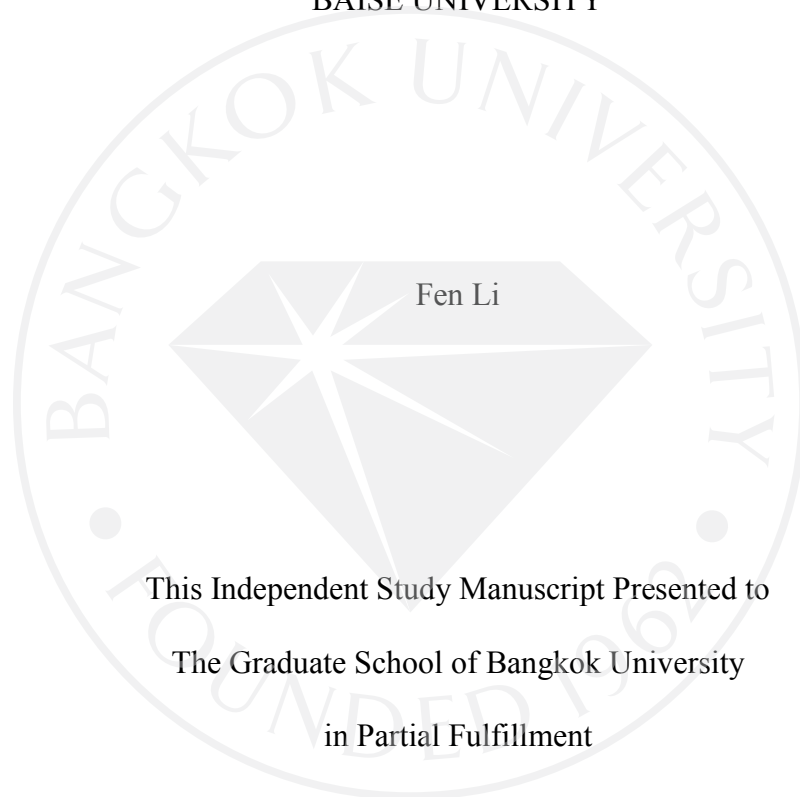


**INVESTIGATING STUDENT PERCEPTIONS ON THE IMPACT OF THE  
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BACHELOR STUDENTS' FUTURE EMPLOYABILITY: A CASE STUDY AT  
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This Independent Study Manuscript Presented to  
The Graduate School of Bangkok University  
in Partial Fulfillment

of the Requirements for the Degree

Master of Business Innovation

2020



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This manuscript has been approved by

the Graduate school

Bangkok University

Title: Investigating Student Perceptions on the Impact of the Course Curriculum of a  
Computer Science Program on Bachelor Students' Future Employability: A  
Case Study at Baise University

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November 11, 2020

Li, F. M.M. (Business Innovation), November 2020, Graduate School, Bangkok University.

Investigating Student Perceptions on the Impact of The Course Curriculum of a Computer Science Program on Bachelor Students' Future Employability: A Case Study at Baise University (129 pp.)

Advisor: Detlef Reis, Ph.D.

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### **ABSTRACT**

This research aims to study the relationship between the computer science curriculum provision and university students' employability. The study adopts a quantitative research approach using questionnaire survey and in-depth interview to analyze the curriculum and employment of Computer Science major students at Baise University. The findings will be used to provide recommendations to improve students' employability.

*Keywords: Computer Science, Curriculum, Employability*

## ACKNOWLEDGEMENT

I would like to express my gratitude to all those who helped me during the writing of this thesis.

My deepest gratitude goes first and foremost to Dr. Detlef Reis, my advisor, for his constant encouragement and guidance. He has walked me through all the stages of my IS. Without his consistent and illuminating instruction, this thesis could not have reached its present form.

Secondly, I would like to thank my co-adviser associate Dr. Qinghua Qin from Baise University, who taught me how to write a literature review and also provided many suggestions for the direction, IS writing.

Thirdly, I would like to thank Dr. Xavier Parisot, who gave us a lot of care and encouragement in study and life.

In addition, I would like to thank the rest of my independent study committee for their encouragement and insightful comments.

Last but not least, would like to express my deep gratitude to all the teachers at IKI-SEA of Bangkok University for their support and encouragement during my study.

Fen Li

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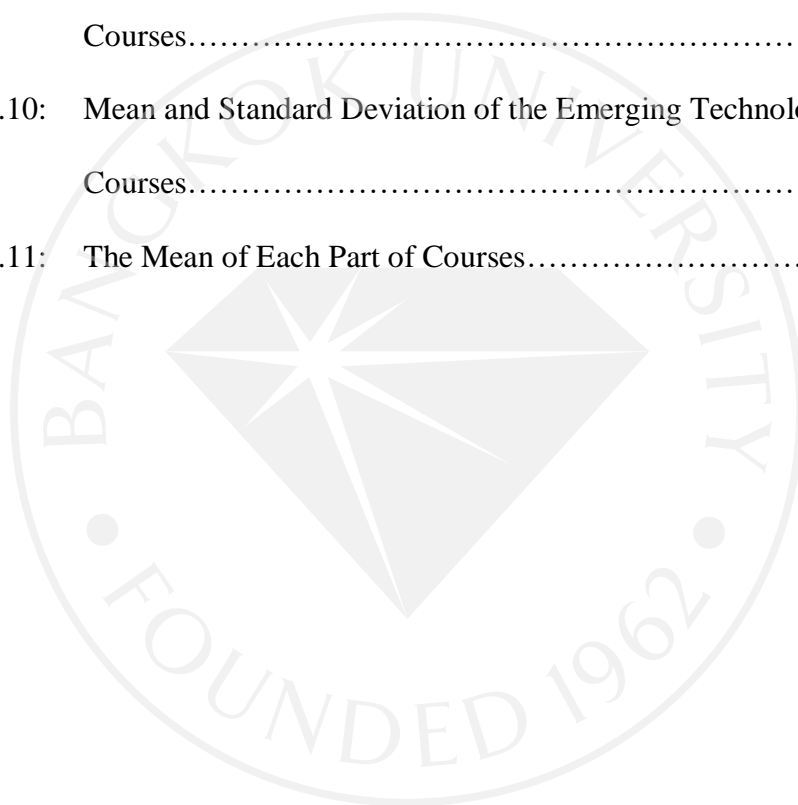


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# CHAPTER 1

## INTRODUCTION

### 1.1 Research Background

Employability is a complex concept. A more extensive definition from the Confederation of British Industry (CBI) recognizes employability as “a set of attributes, skills and knowledge that all labor market participants should possess to ensure they have the capability of being effective in the workplace—to the benefit of themselves, their employer and the wider economy” (Confederation of British Industry, 1999). Employability includes not only the ability to find a job in a narrow sense, but also the ability to complete work and achieve good career development.

Many developing countries have attached importance to the development of education, especially at tertiary level. University is the cradle of talents and the main place for students to obtain employability. The development of employability in graduates has become a significant expectation that governments around the world have, to varying extents, imposed on national higher education systems (Knight & Yorke, 2002). Parallel with country development, to be competitive in modern economic there is a need to reform the education system to be competitive

In China, with the expansion of college enrollment, the number of college students graduating each year has increased and so are the numbers of graduates. In 2017, the total number of graduates reached 7.95 million and a further increase of 8.2 million in 2018 (“China to see 8.2 million”, 2017). The employment problem of college students has always been a critical social issue. With higher enrollment policy among colleges and universities, saw the rise of employment difficulties among

college students and this concern has yet received much attention from all aspects of society (Wu, Garza & Guzman, 2015). How to improve the employability of college graduates has become an urgent problem to be solved in China's colleges and universities. The formation of graduates' employability is closely related to the cultivation mode of colleges and universities (Chen, 2017).

With advancement of science and technology, computer has become an indispensable tool in people work and life. The need for trained computer graduates remained strong. Under this circumstance, the rate of employment for computer graduates should be better but on the contrary, the employment rate for this profession was significantly reduced. In other words, the rapid development of the computer industry and demand for talents has constantly increased. There should be more jobs in the market. However, employment competitiveness of computer major graduates has also intensified (Chen, 2017). Colleges and universities must make full use of their own advantages and characteristics to vigorously improve the employment competitiveness among computer graduates. In so doing, it will promote the employment rate of college computer graduates. This in turns enhance, school efficiency as well as marketing market demand and need for computer expertise. Unfortunately, it is difficult for many graduates to find work due to their lacking in employability. Therefore, to beef up employment competitiveness of computer majors, the current problem needs to be addressed and more research are needed to identify problems and seek solutions.

Nonetheless, graduate employability is a complex issue and needs to be overcome in many ways (O'Leary, 2016). This study will analyze the problem from the perspective of talent training. The perspective of talent cultivation refers to the

formation of graduates' employability and is closely related to the cultivation mode of colleges and universities. The development and improvement of graduates' employability is related to the "teaching" and "learning" activities in colleges and universities, which embeds comprehensive effect of all aspects of teaching (Chen, 2017). From a statistical point of view, this article investigates and analyzes the employment status of computer science graduates of Baise University, and summarizes the relationship between computer professional courses and students' employability. The findings will be used to provide suggestions for improving students' employability.

## **1.2 Research Objectives**

This research objective is presented as follows:

1.2.1 Determine the effectiveness of the computer science curriculum in the teaching process.

1.2.2 Determine the rationality of the computer curriculum structure.

1.2.3 Determine the relationship between the computer science curriculum structure and students' employability.

1.2.4 Find out the indicators that measure graduates' employability related to the curriculum.

### **1.3 Research Questions**

This study investigates the overarching research question:

What changes could Baise University implement in the computer science curriculum to enhance the employability of its bachelor students? I explored this research-guiding question with a set of subordinated questions:

1.3.1 Which courses are outdated and should be reduced (or removed)?

1.3.2 What new courses should be added?

1.3.3 What is the most useful course?

How much do the following courses affect the employability of college students: a) Public courses? b) Theory courses? c) Practical courses? (3) To identify the admission and college training approach and administration which can attract the students' decisions.

### **1.4 Benefits of Study**

With the development of electronic information technology and computing science and technology, many technologies have been eliminated. But at present, many colleges and universities in China retained old syllabus in computer science course, and the learning become obsolete and failed to meet the needs of the present society. With the failure to implement new courses that relate to new technologies development, school education and training become outdated. This in turns adversely affects employability of computer science major.

In addition, some of the teaching content in the colleges and universities lack practicality and restricts students' hands-on practical ability. The end result is that the understanding of the topics are theoretical oriented and students are unable to apply

the knowledge to improve their skill levels. This prevailing problem has been reported by many enterprises that most graduated students lack programming skills, and they are slow to adapt and mastering their jobs could take half a year or more. Inevitably, it becomes increasing burden for the enterprising to train and up skill their new employees. It was also reported that newly graduated recruits required further training from experienced engineers in the company and continuous learning for up to six months. Under such condition, it is thus beneficial to study the relationship between computer science curriculum and students' employability. The findings of the research will enable effective reform in the curriculum for computer science and technology majors. This ultimately will help to optimize the advantages of the curriculum, and promote students' employability.

Based on the above stated reasons, this paper studies some functional outsourcing business in the auto finance industry, to identify an effective outsourcing strategy. The findings will be most advantageous to overcome some of the drawbacks currently faced by the Chinese automotive finance industry. It is thus of great significance for the development of Chinese auto finance industry, in particularly for small and medium-sized firms.



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Factors Affecting the Employability of Graduate Students in China

There are many factors that affect the employability of Chinese college students. Zhu (2015) pointed out that the factors affecting the employability of college graduates are external and internal. The external factors that impact the employability of university graduates evolve the social support systems which embed policy, economic system, the variation in labor market, opportunity, family, school, social organization and information support system. Internal factor, on the other hand, refers to the competent quality of university students. Competent quality in this context is the features that distinguish an excellent worker in a working position from the regular ones. Although, there are many factors affecting employability of graduates, in this study, the researcher will focus only on the related major elements. This study will analyze the curriculum settings that affect the employability of college students from two perspectives. First from the perspective of training talents in colleges and universities and second from the perspective of school. Table 2.1 below shows the factors influencing the employability of graduates in colleges and universities and their specific manifestations.

Table 2.1: The Factors Influencing the Employability of Graduates in Colleges and Their Specific Manifestations

Serial Number	Influence Factors	Specific Manifestations
1	Professional Settings	Higher degree of freedom
2	Training Method	Attaches great importance to the practice, Actively participate in activities
3	Curriculum Structure	Specialized courses, elective courses
4	Teachers' Level	The teacher has abundant knowledge and experience
5	Cultivation Evaluation	Focus on students' continuing education
6	Career Guidance	Guide career planning and career selection

The employability of college students is one of the main training objectives of colleges and universities, especially local applied colleges and newly-built colleges. The main measures and direction of teaching reform should be to improve employability of students (Zhang, 2013). Professional basic knowledge is the most important factor for employers to recruit graduates (Zhu, 2015). It can be seen that among the various factors in Table 1, the third factor, Curriculum Structure, is the most important. The traditional composition of the computer science curriculum system will be stated in 2.2.

## 2.2 Traditional Components of Computer Science Curriculum

The training goals of computer majors in colleges and universities include solid professional theory, skilled professional skills, strong problem analysis and problem solving skills, strong teamwork awareness and independent work ability. According to the training objectives, the computer courses in colleges and universities can be divided into three modules: public basic courses, basic computer courses and computer special courses (Han, 2015). Computer special courses can be divided into two categories based on their fundamental attributes: principle courses and skill courses (Han, 2015). In addition to the above modules, the computer science curriculum should also have a practical innovation module. Although the specific process of cultivating a computer science major in each university in China may be different, the course structure is basically the same. From this, the traditional components of computer science courses: public courses, professional basic courses, professional core courses, professional development courses, practice innovation courses. Different course modules are interrelated and support each other, and different knowledge structures have been constructed. Ping, Jian & Haijun (2018). Figure 2.1, as shown on the following page-illustrates the interrelationship of the various modules in the computing science curriculum structure.

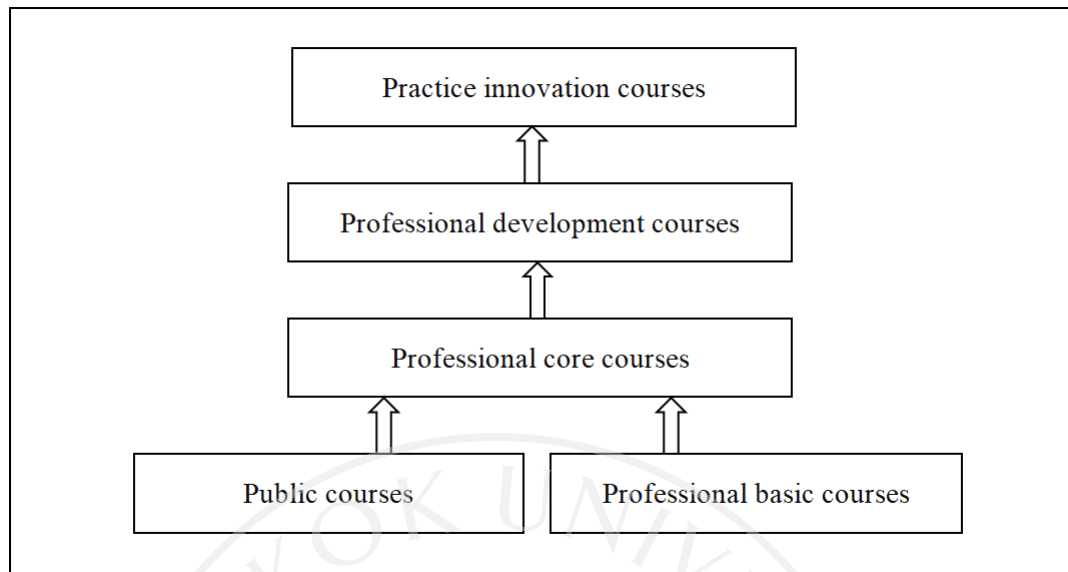


Figure 2.1: Computer Science Curriculum Structure

Next, take Baise University as an example to give a more detailed presentation of the computer science curriculum structure. The curriculum structure of the computer science in Baise University is also divided into five modules: public courses, professional basic courses, professional core courses, professional development courses, and practical innovation courses. Table 2.2 illustrates the details of each module.

Table 2.2: Curriculum Structure of Computer Science in Baise University

Module	Class hour	Credit	Main courses
Public courses	930	48.5	Politics, Philosophy, English, Mental health education, Career development and employment guidance, Military theory, etc.
Professional basic courses	464	25	Introduction to Computers, Advanced Mathematics, Linear Algebra, Programming Basics, Discrete Mathematics, Digital Logic Circuits, Data Structures, Probability Theory and Mathematical Statistics, etc.
Professional core courses	320	16.5	Principles of computer composition, object-oriented programming, database system, computer network, operating system, etc.
Professional development courses	732	34.5	Software engineering, web front-end design, cloud computing technology, digital image processing, big data algorithm design, artificial intelligence and machine learning, software testing, computer assembly and maintenance, etc.

(Continued)

Table 2.2 (Continued): Curriculum Structure of Computer Science in Baise University

Module	Class hour	Credit	Main courses
Practical innovation courses	39 weeks	45.5	Safety education, school sports meeting, social practice, volunteer labor, military training, comprehensive practical training of professional courses, professional practice, graduation design, vocational qualification, subject skill competition, etc.

Note: 1 class hour = 40 minutes, in Baise University.

The content in Table 2.2 is from Baise University's "Undergraduate Talent Training Program for Computer Science and Technology" in 2019. Table 2.2 shows the curriculum structure of computer science in Baise University consists of public courses, professional basic courses, professional core courses, professional development courses and practical innovation courses. These courses are spread over eight different semesters. If the students want to get a Bachelor's degree, they are required to study 2,446 class hours and 39 weeks of internships during college. Obviously, students' study tasks during university are very heavy.

## 2.3 Employability of Computer Science Graduates

Regarding the employability of computer science graduates, this study expounds on the employment status of computer science students and the problems in the employability of computer science students.

### 2.3.1 The employment status of computer science students

#### 1) The number of computer science graduates is steadily increasing

Under the influence of the vigorous development of computer-related industries, computer-related majors have gradually become a popular industry. Many students prefer to study in computer majors, and this has led to a continuous increase in the number of computer-related graduates across the country. In 2017, according to the National Computer Science and Technology Graduate Employment Big Data Report, the number of computer major graduates even exceeded 100,000. This finding indicates the popularity of the computer science major. However, with the increasing popularity of computer majors, various colleges and universities have also gradually opened computer-related majors, resulting in the school exporting too many students which resulted in the problem of an oversupply of new graduates.

#### 2) Higher market demand in higher skill levels

The demand for professionals in computer science is constantly increasing, and the rapid development of computer technology. Computers have penetrated into all aspects of social life. Computer application skills have become basic social skills. Employers have put forward higher requirements for computer majors.

### 3) Computer major is greatly influenced by other majors

In today's era, "Internet +" related industries have been well developed. The Internet economy has also been greatly developed. With the popularization of Internet + technology, almost all colleges and universities have opened computer basic course, students can take these courses at different levels of computer grade examinations. What this means is that the direction of colleges and universities to develop computer literate gradually changes from a single type to a compound type. With the mastery and learning of computer knowledge by other professional students, it has affected the employment of computer students to a certain extent, making computer students having to work harder to gain professional knowledge and exercise professional practical skills.

#### 2.3.2 The problems in the employability of computer science students

##### 1) Students' career orientation is unclear

Many college students like to play games during their studies, they do not have clear learning goals. According to relevant data, there is a large part of college students lack of faith, after entering the university was not based on their own interests and they were not career minded. This cause is confusion among the students resulting in half-heartedness and disinterested to learn and lagged behind the better students in terms of employment opportunity.

##### 2) Students have a poor professional foundation

Most Chinese undergraduate students in computer science need to take more than 40 courses to complete the full course. The content of these courses are extensive and include various fields of computer such as principle, operating system, programming, office software, multimedia, graphic, 3D design, database, web design,



etc. If students are proficient in all these courses, then they are well trained. They will be had jobs such as programmers, graphic designers, network administrators, and hardware maintenance technicians. However, the duration of each course is limited, and it is impossible for students to master the content of each course within a limited time. Most students only studied to pass the exam. The overall professional foundation of the students remained low and weak.

### 3) Students' practical ability is not strong

Practical ability mainly refers to students' ability to solve practical problems, analysis ability and operation ability. Majority of employers hope that the newly recruits can immediately be qualified for their jobs, but the reality is that some college students have rarely participated in any form of social practice except for classes in the four-year college life. According to employers, 80% of college graduates have relatively weak practical ability, and many college students could only focus on what they have learned in school. The problem of a high score and low energy prevails.

## **2.4 Emerging New Fields in Computer Science**

Today, electronic technology, computer technology and Internet technology are developing rapidly. Big data, artificial intelligence, blockchain technology, etc. are triggering a new round of education reform, which provides important support for improving the quality of education in decision-making. Education governance and promoting education become more precise, personalized and intelligent (Lee, 2019). Under this section, I will describe the impact of big data, artificial intelligence and blockchain on the employment of college students.

Big data has two meanings: first, big data is a summary concept and a general term for massive data; second, big data is a new type of capabilities and methods (De Mauro, Greco & Grimaldi, 2015). The strategic significance of big data technology is not to grasp huge data information, but to professionally process these meaningful data (Yang, Huang, Li, Liu & Hu, 2017). Colleges and universities students are important human resource in China. The employment of college graduates occupies an important position in the work of colleges and universities. How to improve the employment quality of college graduates is a question that every education manager must consider. The application of big data to the employment of colleges and universities will break through the limits of employment recommendation methods and brings new opportunities for the employment reform of college students. Under the background of big data, constructing college employment service systems can mine useful information from massive employment information and predicts future employment behavior of college students. This there by enables better decision making the education management department. Scientific data analysis methods can summarize the expected job changes of students, provide them with accurate employment guidance, and improve the employment quality of graduates.

Artificial intelligence, or AI for short, is a new scientific technology that studies and develops the simulation, extension, and expansion of human intelligence. In other words, artificial intelligence is the study of how to use computers to accomplish tasks that previously required human intelligence. The development of artificial intelligence will have a tremendous impact on human society in the 21st century and bring about vast changes. With the advent of the era of 5G and big data, the application of artificial intelligence has been very extensive. The rapid

development of artificial intelligence has triggered a panic about "machines replacing people", especially in the impact of artificial intelligence on the employment of college students. Artificial intelligence not only impacts jobs, but also job skills. The skill requirements of many positions are changing. If workers fail to learn and meet new skill requirements in time, they can easily be eliminated from their original jobs and miss opportunities to transfer to new jobs. Some professionals said that artificial intelligence will have a significant impact on the employment structure. This reminds us that we must attach great importance to the huge impact of artificial intelligence technology on employment and actively seize this new opportunity.

As for blockchain, from the perspective of science and technology, it involves many scientific and technical issues such as mathematics, cryptography, Internet and computer programming. From an application perspective, in simple terms, the blockchain is a distributed shared ledger and database, with the characteristics of decentralization, non-tampering, leaving traces throughout, traceability, collective maintenance, openness and transparency. These characteristics ensure the "honest" and "transparency" of the blockchain, and lay the foundation for creating trust in the blockchain (People's Daily, 11/4/2019, "Blockchain, the breakthrough of lane change and overtaking"). In 2016, the Ministry of Education issued the "Notice on Carrying Out the Employment Service for Graduates of National Colleges and Universities", which requires that we attach great importance to the work of precision employment services, establish a platform for precision matching services, and put forward requirements for strengthening precision services and implementing precision assistance for college students' employment to promote appropriate employment for college students. Since then, the relevant government

departments of China have made the realization of precise employment of college students an important goal. Due to the characteristics of decentralization, de-trust, traceability, openness and non-tampering, blockchain technology can solve major problems in the current employment of college students in a targeted way and provide opportunities for the realization of precision employment of college students.



## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Research Design**

On the basis of literature review, open-ended surveys and questionnaires were used to conduct the study. And by combining interviews with narrative coding, a mixed approach is used to design the framework and the variables of the interview content. In order to design open interviews and determine the satisfaction index of the curriculum on computer science in Baise University, this chapter mainly conducts research based on the following steps:

3.1.1 According to the theme and research questions of this thesis, the first round of interviews with students was conducted to explore the reasons why the curriculum setting affects employability. And some keywords were summed up in the stage, for example, “What professional knowledge do students need in their work?” “Which knowledge is useful to their work, and which one is not?” and so on.

3.1.2 On the basis of the first round of interviews and reviewing a large number of literatures, this thesis summarized the keywords that affect students’ employability and improve students’ employability, and then it used these keywords to design more detailed questions.

3.1.3 The keywords were recorded and compiled in tabular form. And then a list of interview questions was designed for the second round of interviews.

3.1.4 The second round of interviews was conducted with four senior students majoring in computer science at Baise University. Its tasks were to record the contents of the interview, to analyze the keywords in the interview records, and

then to summarize and classify the keywords according to the literature, attempting to find out which courses are useful for students' work, which ones are useless, which ones are outdated, which ones are necessary but have not yet been offered, and which ones have been repeated, and the like.

3.1.5 According to the results sorted out in the fourth step, a course satisfaction questionnaire is set up. And based on the interview data and variable keywords, the questions and content of the Baise University Course Satisfaction Questionnaire were designed.

Table 3.1 shows the steps and process of the survey on computer science course satisfaction at Baise University.

Table 3.1: Steps and Process of Survey on Computer Science Course Satisfaction at Baise University

Step	Operating
Step 1	Conduct the first round of interviews with students, initially understand the students' needs of the knowledge, and summarize the corresponding keywords
Step 2	On the basis of the first round of interviews, summarize the keywords that affect students' employment and improve their employability, and design open interview questions.
Step 3	Use a table to record the source and citation of the corresponding keywords, Design a list of interview questions

(Continued)

Table 3.1 (Continued): Steps and Process of Survey on Computer Science Course Satisfaction at Baise University

Step	Operating
Step 4	Conduct a second round of interviews with students, analyze the more keywords in the interview record to complete the conceptual framework
Step 5	Set up the content and questions of the satisfaction survey questionnaire for Baise University 's computer science course

### 3.2 Data Collection

#### 3.2.1 Keywords collection

The first round of interviews took place on May 3, 2020. This study interviewed four senior students of computer science at Baise University. The purpose of the first round of interviews was to collect initial keywords related to the curriculum that affect employability. The interview was conducted through Wechat. They were only let to talk about their work and their studies at school. And not many specific questions were given. The interviewer mainly listened to what they were saying. In the first round of interviews, they mentioned the knowledge needed at work, courses that are helpful to work, courses that are not helpful to work, favorite courses and gains and inspiration from university courses, and so on. Table 3.2 is the keywords related to the curriculum setting that affect the employability of college students.

Table 3.2: Initial Keywords Collected in the First Round of Interviews

ID	Initial keywords	Relater
1	Knowledge needed at work	Pan Yuqin, Huang Jieli, Wan Jinrun, Liang Guilan
2	Gain or inspiration from university courses	
3	course most helpful at work	
4	course most useless at work	
5	favorite courses	

### 3.2.2 Qualitative Analysis

According to the keywords in Table 3.2, seven open questions were set.

When setting open interview questions, in addition to using the keywords in Table 3.2, two questions were added. These two questions involve improvements and deficiencies in the curriculum. The seven questions are:

Question 1: Based on your personal work and career development plans, what kind of course knowledge do you need?

Question 2: What inspiration or gains did you get from the courses learned at the university?

Question 3: What course do you find most interesting and most helpful to you? Why? How to use it in your work?

Question 4: What courses do you think is the least interesting and does not help you? Why?

Question 5: What do you think are the shortcomings of your university curriculum?



Question 6: What kind of improvements would you like to see in the program? Why?

Question 7: What NEW courses would you like to see in the program? Why?

After setting the above open questions, a second round of interviews with students was conducted. In this round four senior students of computer science at Baise University who will graduate in this July were interviewed. The study chose them as the interviewees because they have just finished their internship. They know what knowledge they urgently need and what knowledge they no longer need. The interview was conducted on May 8, 2020. The interview was conducted online on May 8, 2020. The interview time for each student is 15-20 minutes. The whole interview was recorded and saved in form of video clip. This interview is more detailed. Each of the interviewees answered seven questions in detail, so the information the study collected after the interview became more and more accurate.

In the interview I collected a lot of original information, from which I summarized the keywords, and then encoded and tagged them, and last these key words were classified, analyzed and summarized. The detailed format of the narrative coding and theme from raw data interview is provided in Appendix B. The information from the interview is as follows:

1) Gains get from the courses learned at the university

- Set up theoretical courses and physical education classes, making a good balance between study and rest for students.
- Set up practical courses and school year design courses, improving students' practical ability.

– Lectures on etiquette management as an optional course for students to choose.

2) The shortcomings of the university curriculum

- Too many theoretical courses.
- Few practical courses.
- Some professional courses are outdated.
- The start of the professional class is too late.

3) The expected changes

- Practice project should be set up.
- C Programming should be taken in the first semester.

4) The expected improvements

- More practice.
- Retain some of the previous excellent compulsory courses.
- Reduce some theoretical courses.
- Remove repeated courses.
- Teachers with practical experience come to class.
- Set up some new technology courses.

In addition to the above information, students also mentioned many courses, which I classified as helpful courses, useless courses, unwanted courses, repeating courses, and expected new courses, which were filled into Table 3.3 by category.

Table 3.3: The Courses Mentioned in the Interview

The kind of courses	Helpful courses	Useless courses	Unwanted courses	Repeating courses	Expected New courses
Public courses	Career development and employment guidance,	Military Management, Mental Health Education, Marxist Philosophy	Red Revolution		
Professional basic courses	C language,	Digital Logic Circuit	Digital Logic Circuit		Object-oriented Programming
Professional core courses	Java programming, Principles of computer composition, data structure, computer network,			Database management (MySQL, Oracle,	

(Continued)

Table 3.3 (Continued): The Courses Mentioned in the Interview

The kind of courses	Helpful courses	Useless courses	Unwanted courses	Repeating courses	Expected New courses
Professional core courses	operating system,			SQL Server)	
Professional development courses	Python, PHP, Nodejs, Photoshop, HTML5, Artificial Intelligence, Software	Flash Animation, .net	Dreamweaver, Flash Animation .net		HTML5, ECMAScript 6, Python, Unity3D, Algorithm Analysis and Design,
Professional development courses	Engineering New media courses				JavaEE, Video Editing, ReactJS, AngularJS, Artificial Intelligence

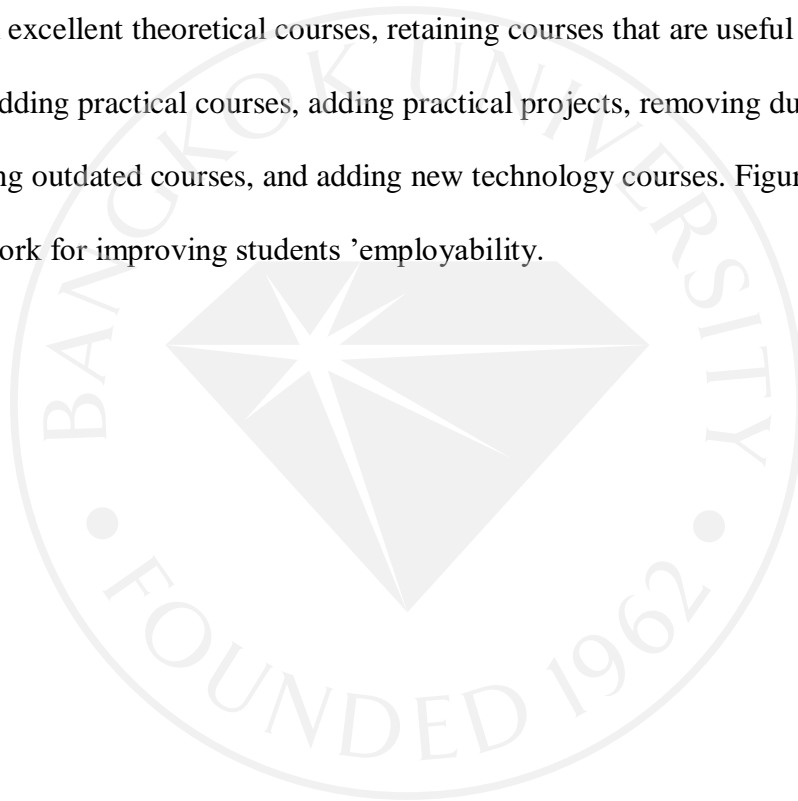
(Continued)

Table 3.3 (Continued): The Courses Mentioned in the Interview

The kind of courses	Helpful courses	Useless courses	Unwanted courses	Repeating courses	Expected New courses
Professional development courses					Big Data, Cloud Computing Photoshop Python, JavaScript Angular, Vue, Blockchai, 3D animation technology
Practice innovation courses	WeChat applet, Practical Training, Project Development				School year design

### 3.2.3 Conceptual Framework

Based on the interview information collected from students, I understand that there are some shortcomings in the existing curriculum. The factors that affect students' employability are: some courses are outdated, practical courses and practical hours are few, some courses are repeated, and some courses are useless for work. Factors to improve the employability of students include: retaining some of the original excellent theoretical courses, retaining courses that are useful for student work, adding practical courses, adding practical projects, removing duplicate courses, removing outdated courses, and adding new technology courses. Figure 3.1 is the framework for improving students' employability.



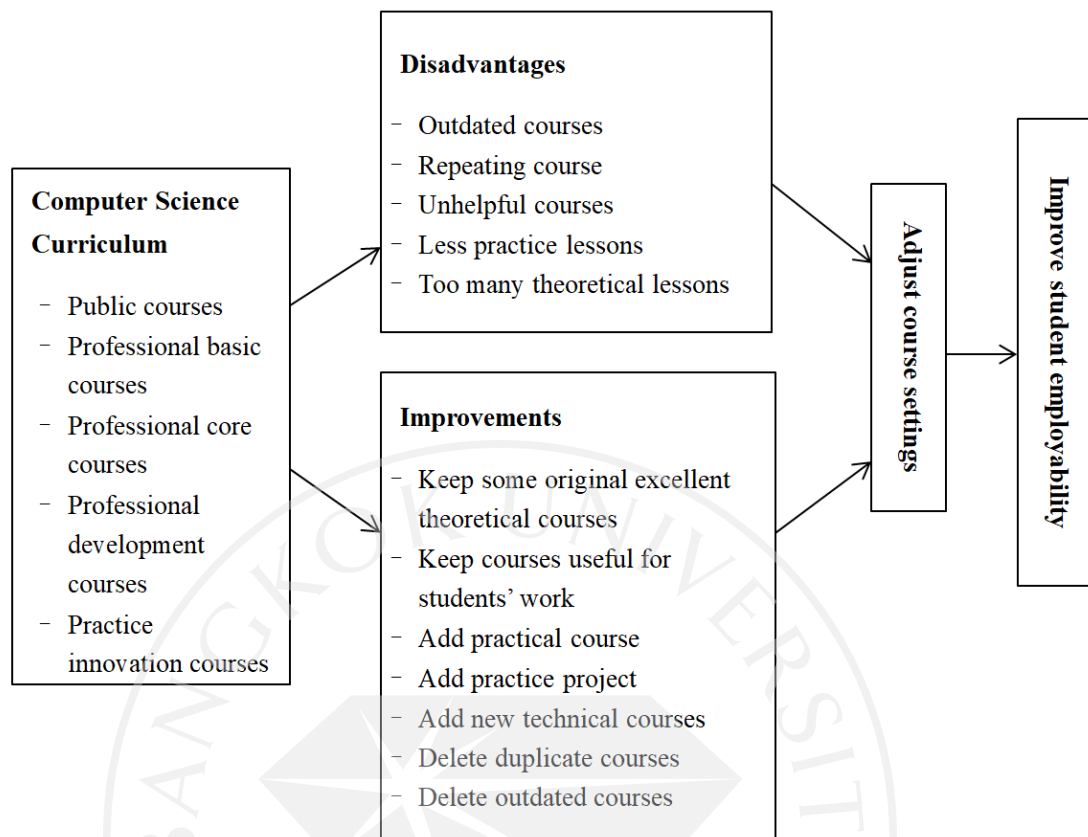


Figure 3.1: Framework for Improving Students 'Employability

### 3.2.4 Quantitative Analysis

Based on the above analysis, the questionnaire of this study is divided into three parts. Part 1 is single-choice questions, which mainly counts the characteristics of the respondents. Part 2 is scale questions, which investigates the importance of curriculum improvement in increasing employability. There are 10 questions in this part. There are six answers to each question. They are showed in Table 3.4.

Table 3.4: Importance and Score

Not important at all	Not important	Rather not important	Rather important	important	Very important
1	2	3	4	5	6

Part 3 is also scale questions, which investigates the usefulness of the curriculum in improving employability. There are 31 questions in this part. There are six answers to each question, as showed in Table 3.5.

Table 3.5: Usefulness and Score

Not useful at all	Not useful	Rather not useful	Rather useful	useful	Very useful
1	2	3	4	5	6

A general question is given at the end of the questionnaire to investigate the students' overall views on the university curriculum. The question is:

Overall, how would you rate the prospects of student employ ability (= chances for a undergraduate student to find a good job after completing their studies in the program) of the current Computer Science course curriculum at Baise University?



1 = Very poor 2 = Poor 3 = Rather Poor 4 = Rather high 5 = High 6 = Very high

### 3.3 Statistical Data Analysis

#### 3.3.1 Sampling

##### 1) Qualitative Research Sampling

Four specific research samples are selected through specific sampling methods. They are seniors majoring in computer science at Baise University, and the questions were tested so as to find something unknown.

##### 2) Quantitative Research Sampling

To better collect the sample data of the questionnaire better, this thesis made and published the online questionnaire by using the free online survey link provided by the “WENJUANXING” online survey webpage, so that the respondents could access, fill in and submit the questionnaire online.

The questionnaire was published online on May 20, 2020. It was mainly distributed to senior students of computer science in Baise University. One week later, 42 valid questionnaires were collected. One of the sophomores and four juniors participated in the filling, and the remaining 37 ones were seniors.

In the questionnaire survey of students, respondents' expectations for objective factors were based on a Likert-style 6-point scale, with responses ranging from 1 (Not important at all/ Not useful at all) to 6 (Very important/ Very useful) In order to determine the range of Likert scale, the width of the class interval was obtained by dividing the data range with the selected class number. Then the difference ( $6-1 = 5$ ) between the minimum value and the maximum value was found out, and it was divided by the number of choices in the analysis, i.e. ( $5/6 = 0.83$ ). In

this case, the average score of the measurement scale was evaluated, as shown in Table 3.6.

Table 3.6: Class Interval of Six Points' Likert scale

Points	Evaluation	Range
6	Very important/ Very useful	5.20~6.0
5	Important/ Useful	4.36~5.19
4	Rather important/ Rather useful	3.52~4.35
3	Rather not important/ Rather not useful	2.68~3.51
2	Not important/ Not useful	1.84~2.67
1	Not important at all/ Not useful at all	1~1.83

In order to understand the demand for talents by employers, in February 2020, 15 questionnaires were distributed to employers via the Internet, and 10 valid questionnaires were collected. In the questionnaire survey of employers, respondents' expectations for objective factors were based on a Likert-style 5-point scale, with responses ranging from 1 (Not at all importance) to 5 (Very importance). The class interval of five points' Likert scale is shown in Table 3.7.

Table 3.7 Class Interval of Five Points' Likert Scale

Points	Evaluation	Range
5	Very importance	4.21~5.00
4	Fairly importance	3.41~4.20
3	Moderately importance	2.61~3.40
2	Slightly importance	1.81~2.60
1	Not at all importance	1.00~1.80

### 3.3.2 Research Tools

#### 1) Online survey

Because the subjects are seniors majoring in computer science at Baise University in China, only online surveys are available. Here is the Chinese questionnaire link “<https://www.wjx.cn/jq/78331898.aspx>”.

#### 2) Quality of the tools and validity

There were 51 questions in the questionnaire. The questionnaire was in Chinese and translated by a Ph.D. expert.

#### 3) SPSS

This study uses SPSS and EXCEL to analyze the questionnaire data. SPSS is a general term for a series of software products and related services used for statistical analysis operations, data mining, predictive analysis, and decision support tasks. SPSS uses a similar EXCEL form to input and manage data. The data interface is more general and can easily read data from other databases. The statistical process

includes commonly used and more mature statistical processes, which can fully meet the work needs of non-statistical professionals.

### **3.4 Summary**

It is the key and important task to select and determine independent variables, dependent variables and evaluation indicators, and establish an evaluation system.

The evaluation system of this independent study is based on the principles of objectivity and practicality. Through literature research and interviews, I found relevant independent variables and evaluation indicators that improve students' employability. Through in-depth analysis of the literature, reasonable independent variables and evaluation indicators are constructed to provide data support for the design of the conceptual framework and questionnaire.

## CHAPTER 4

### DATA ANALYSIS

#### 4.1 Descriptive Statistical Analysis

This part analyzes the individual choices in the questionnaire, including the student's occupation, the time when the basic course of programming is started, the time when the professional direction is separated, the choice of repeated courses and the help of the Baise University curriculum system for students to find a job.

Table 4.1: shows the frequency of student's current occupation or possible future occupation

Current job or Future Job					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Civil servant	2	4.8	4.8	4.8
	Teacher	3	7.1	7.1	11.9
	IT company	23	54.8	54.8	66.7
	Other	14	33.3	33.3	100.0
	Total	42	100.0	100.0	

Table 4.1 shows that among the 42 students surveyed, among the current occupations or occupations that may be engaged in the future, students may have the highest proportion of work in IT companies, accounting for 54.8%, followed by

others, accounting for 33.3%. Civil service is 4.8%, teachers are 7.1%. This means that most students have a clear employment intention before graduation, and they will go to the IT companies to work after graduation.

Table 4.2: Surveys the start time of C language programming course

In which Semester C Programming Should Begin:					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	The first semester of the first grade	19	45.2	45.2	45.2
	The second semester of the first grade	17	40.5	40.5	85.7
	The first semester of the second grade	3	7.1	7.1	92.9
	The second semester of the second grade	3	7.1	7.1	100.0
	Total	42	100.0	100.0	

Table 4.2 shows that 45.2% of students think that C language programming should be opened in the first semester of the first grade. 40.5% of students think it should be opened in the second semester of the first grade. It is believed that C language programming should be established in the first semester of the second grade and the second semester of the second grade are both 7.1%.

This means that most students believe that C programming should start as early as possible, and it should start in the first year of college. In this way, students are able to study other professional courses earlier.

Table 4.3: Shows the frequency of time to separate professional directions

Time to Separate Professional Directions					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before entering university	23	54.8	54.8	54.8
	After the first grade	12	28.6	28.6	83.3
	After the second grade	4	9.5	9.5	92.9
	After the third grade	3	7.1	7.1	100.0
	Total	42	100.0	100.0	

Table 4.3 shows that among the 42 students surveyed, 54.8% of the students felt that they should divide their majors before entering the university. 28.8% of students think that professional separation should be after the first grade. 9.5% of students think that professional separation should be after the second grade. 7.1% of students think that professional separation should be after the third grade. This means that the separation of professional directions should be as early as possible.

Table 4.4: Shows rate the prospects of student employability of the current Computer Science course curriculum at Baise University

The Prospects of Student Employability of the Current Computer Science Course Curriculum at Baise University					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very poor	2	4.8	4.8	4.8
	Poor	1	2.4	2.4	7.1
	Rather Poor	5	11.9	11.9	19.0
	Rather high	21	50.0	50.0	69.0
	High	6	14.3	14.3	83.3
	Very high	7	16.7	16.7	100.0
	Total	42	100.0	100.0	

It can be seen from Table 4.4 that Very poor is 4.8%, Poor is 2.4%, Rather Poor is 11.9%, High is 6%, Very high is 7%. Among them, rather high has the highest proportion, which is 50%. It means that the current curriculum is not very helpful for students' employment prospects. The curriculum needs to be improved.

#### 4.2 Employers' Opinions Analysis

In order to understand employers' demand for talents, this study sent questionnaires to students' employers. The questionnaire was conducted in the form of a scale. Eleven factors were investigated: (1) Professionalism at work. (2) Observe



professional ethics. (3) Abide by unit discipline and national laws and regulations. (4) Explorative spirit at work. (5) Innovative spirit at work and related capabilities. (6) Mastery and application of professional knowledge. (7) Adaptability of what you have learned to your job. (8) Competence for the job. (9) Cooperative communication skills. (10) Organizational management. (11) Integrity and Loyalty to Your Unit.

Figure 4.1 and Figure 4.2 compare the importance of these 11 factors. These 11 factors are divided into these two figures.

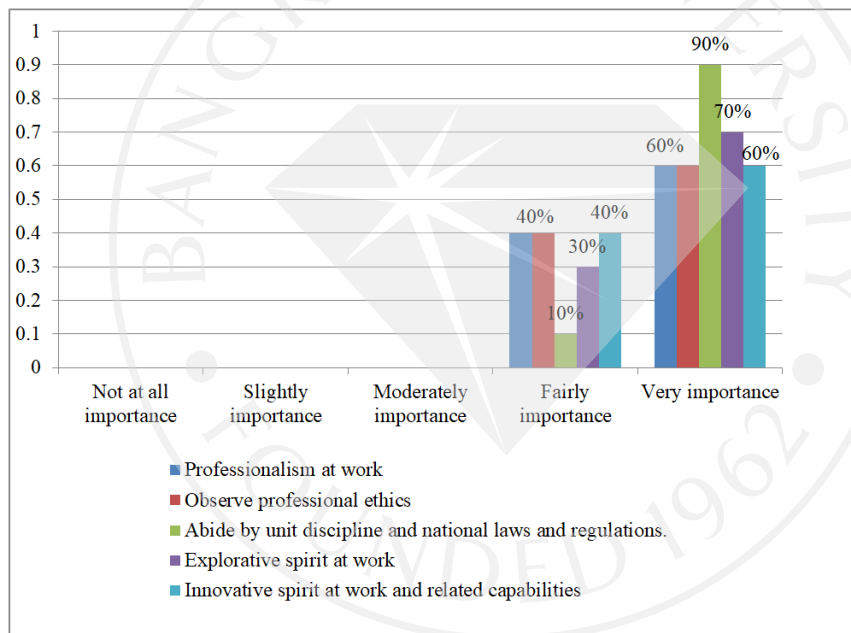


Figure 4.1: Comparison of the Importance of Employer's Opinions (1-5)

Figure 4.1 is a comparison of the importance of employers to factors (1)-(5). It can be seen from Figure 4.1 that their views on these five factors are concentrated in the two levels of "Fairly importance" and "Very importance". The percentages of other levels are 0.

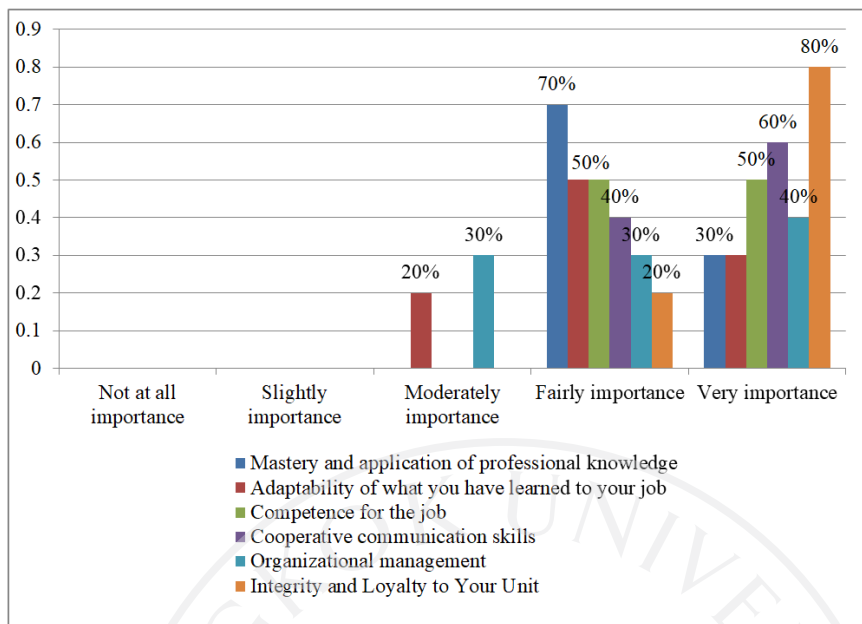


Figure 4.2: Comparison of the Importance of Employer's Opinions (6-11)

Figure 4.2 compares the importance of (6)-(11) factors by employers. As can be seen from Figure 4.2, their views on these six factors mainly focus on the two levels of "Fairly importance" and "Very importance". Only "Adaptability of what you have learned to your job" is 20% and "Organizational management" is 30% in "Moderately importance" level. Both "Not at all importance" and "Slightly importance" are rated 0%.

Table 4.5: Mean the importance of factors of employer's opinions

Factors to improve employability	Mean	N
Abide by unit discipline and national laws and regulations.	4.9	10
Integrity and loyalty to your unit	4.8	
Explorative spirit at work	4.7	
Professionalism at work	4.6	
Observe professional ethics	4.6	
Innovative spirit at work and related capabilities	4.6	
Cooperative communication skills	4.6	
Competence for the job	4.5	
Mastery and application of professional knowledge	4.3	
	(4.21-5.00)	
Adaptability of what you have learned to your job	4.1	10
Organizational management	4.1	
	(3.41-4.20)	

According to Table 4.5, Employers consider Abide by unit discipline and national laws and regulations, Integrity and loyalty to your unit, Explorative spirit at work, Professionalism at work, Observe professional ethics, Innovative spirit at work and related capabilities, Cooperative communication skills, Competence for the job and Mastery and application of professional knowledge are very important, reaching the level of "Very importance" (range 4.21 ~ 5.00). Adaptability of what you have

learned to your job and Organizational management are the least important, with mean of only 4.1, which belongs to the "Fairly importance" level (range 3.41 ~ 4.20). Although "Mastery and application of professional knowledge" also belongs to the very importance level, it has a mean score of 4.3, ranking the last in this level. This means that students' mastery of professional knowledge is not the most important condition for employers to hire talents.

### 4.3 Analysis of the Importance of Factors to Improve Employability

In the survey of students, I learned that set up school year design classes, increase practical hours, reduce theory hours and other ten factors are conducive to improving students' employability, but the importance of each factor is different.

Table 4.6 is the mean and standard deviation of the importance of factors to improve employability.

Table 4.6: Mean and Standard Deviation of the Importance of Factors to Improve Employability

Factors to improve employability	Mean	Std. Deviation	N
Set up school year design classes to give students the opportunity to participate in a complete project development.	5.26	1.037	42
	(5.20-6.0)		

(Continued)

Table 4.6 (Continued): Mean and Standard Deviation of the Importance of Factors to Improve Employability

Factors to improve employability	Mean	Std. Deviation	N
Increase practical hours.	5.19	1.174	42
Increase practical courses.	5.14	1.002	
Set up some new technology courses.	5.07	0.973	
The start of the professional class should not too late.	5.02	1.047	
Retain some of the previous excellent professional compulsory courses.	4.59	1.011	
Professional courses are consistent with social needs.	4.88	1.234	
Remove repeated courses.	4.88	1.064	
Teachers with practical experience come to class.	4.60	1.483	
	(4.36-5.19)		
Reduce theory hours.	3.67	1.574	
	(3.52-4.35)		

According to Table 4.6 the factor of "Set up school year design classes to give students the opportunity to participate in a complete project development." is the most important, mean is 5.26, reaching the level of "very important". Followed by "Increase practical hours.", "Increase practical courses.", "Set up some new

technology courses.", "The start of the professional class should not too late.", "Retain some of the previous excellent professional compulsory courses.", "Professional courses are consistent with social needs", "Remove repeated courses" and "Teachers with practical experience come to class.", their mean value is between 4.36 to 5.19, which belongs to the "Important" level. The least important is "Reduce theory hours", mean is 3.67, which belongs to the level of "Rather Important".

According to the above analysis, it is found that students are very interested in practical courses. Students think it is very important to set the school year design to give them the opportunity to participate in a complete project development, reaching the "Very important" level. Among other items, practice has a very high average. It means that practical courses are very important for improving students' employability.

#### **4.4 Analysis of Courses Usefulness**

The computer curriculum system is composed of five parts: public courses, professional basic courses, professional core courses, professional development courses and practical innovation courses. The importance of practical courses has been analyzed in Section 4.2. The professional basic courses and professional core courses are mainly composed of some classic theoretical courses in computer science. The contents of these two parts are compulsory courses. In order to facilitate data analysis, the professional basic courses and professional core courses are merged into professional required courses. This part will analyze the four parts of public courses, professional required courses, professional development courses and computer science emerging technology course.

#### 4.4.1 Analysis of public courses

There are many public courses in computer science. In the course of the investigation, students mentioned several courses in physical education, etiquette management lectures, career development and employment guidance, history of the Red Revolution and military management. A scale questionnaire was set up to investigate these seven courses. The questionnaire sets six levels for each course: Not useful at all, Not useful, Rather not useful, Rather useful, Useful, Very useful. Figure 4.3 shows the usefulness of five public courses. The five different colors in the figure represent five different courses. Mark the highest and lowest data for each level in Figure 4.3.

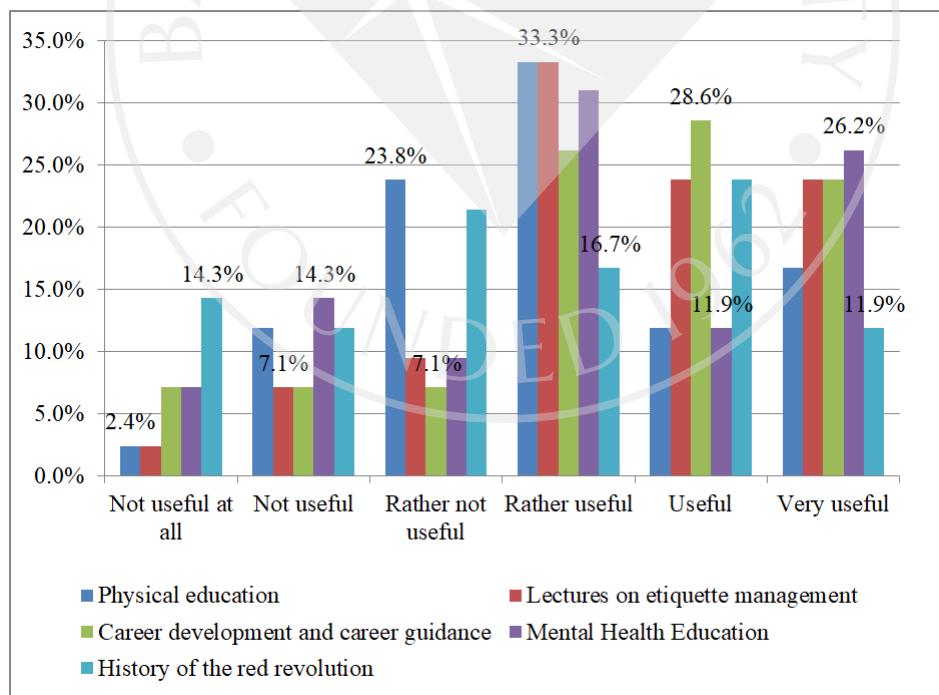


Figure 4.3: Comparison of the Importance of Five Public Courses

According to Figure 4.3, in the "Not useful at all" level, the Red Revolution history accounted for the highest proportion, at 14.5%, and physical education and etiquette management lectures were the lowest at 2.5%. In the "Not useful" level, the highest is 14.3% of Mental Health Education, and the lowest is 7.1% of Lectures on etiquette management and Career development and career guidance. In the "Rather not useful" level, the highest is 23.8% of Physical education, and the lowest is 7.1% of Career development and career guidance. In the "Rather useful" level, the highest is 33.3% of Physical education and Lectures on etiquette management, and the lowest is 16.7% of History of the red revolution. In the "Useful" level, the highest is 28.6% of Career development and career guidance, and the lowest is 11.9% of Physical education and Mental Health Education. In the "Very useful" level, the highest is 26.2% of Mental Health Education, and the lowest is 11.9% of History of the red revolution. Table 4.7 is the mean and standard deviation of the public courses.

Table 4.7: Mean and Standard Deviation of the Public Courses

Public course	Mean	Std. Deviation	N
Lectures on etiquette management	4.40	1.289	42
	(4.36-5.19)		
Career development and career guidance	4.33	1.476	
Mental Health Education	4.05	1.592	
Physical education	3.90	1.322	42
Military Management	3.76	1.576	

(Continued)



Table 4.7 (Continued): Mean and Standard Deviation of the Public Courses

Public course	Mean	Std. Deviation	N
History of the red revolution	3.60	1.609	
	(3.52-4.35)		

According to Table 4.7, the mean of Lectures on etiquette management is 4.4, belongs to the "Useful" level. The average of the remaining courses is between 3.6 and 4.33(range 3.52 ~ 4.35), which belongs to the "Rather useful" level.

In summary, it is found that public courses are not very helpful for improving students' employability. Among the six courses mentioned by students, except Lectures on etiquette management belongs to the "Useful" level, the other courses only belong to the "Rather useful" level.

#### 4.4.2 Analysis of Professional compulsory courses

This section studies the usefulness of the 7 courses required for professional courses. The scale is used for research. Figure 4.4 shows the usefulness of the seven professional compulsory courses.

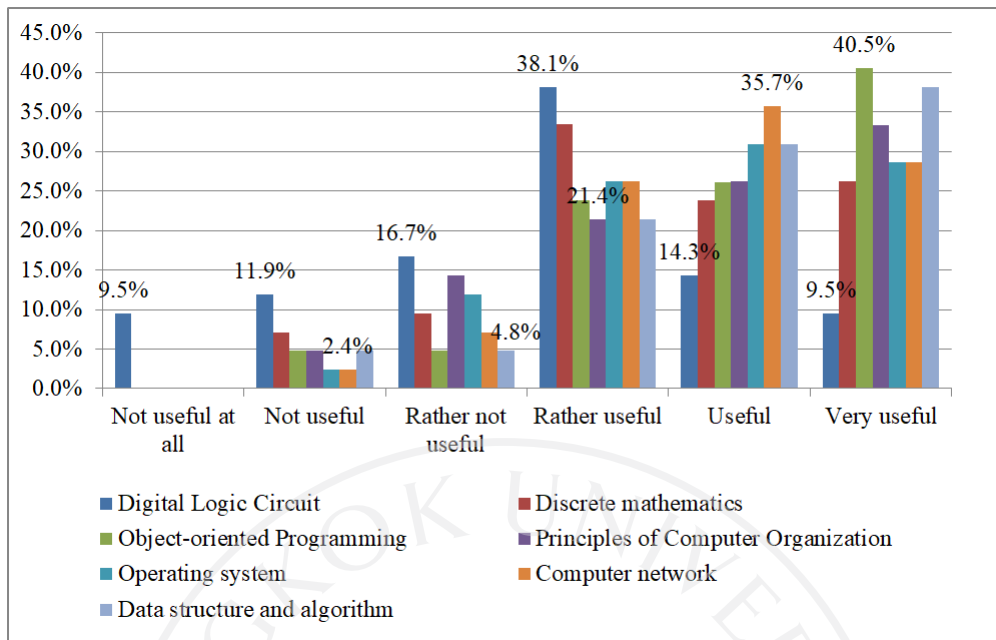


Figure 4.4: Comparison of the Importance of Seven Professional Compulsory Courses

According to Figure 4.4, in the "Not useful at all" level, the Digital Logic Circuit accounted for the highest proportion, at 9.5%. It is worth noting that in the "Not useful at all" level, except for digital logic circuits, the percentage of other courses is 0. In the "Not useful" level, the highest percentage is for Digital Logic Circuit, which is 11.9%, and the lowest percentage is for Operating systems and Computer network, which are both 2.4%. In the "Rather not useful" level, the highest percentage is for Digital Logic Circuits, which is 16.7%, and the lowest percentage is for Object-oriented Programming and Computer network, which are both 4.8%. In the "Rather useful" level, the highest is 38.1% of Digital Logic Circuit, and the lowest is 21.4% of Computer composition principles and data structures and algorithms. In the "Useful" level, the highest is 35.7% of Computer network, and the lowest is 14.3% of Digital Logic Circuit. In the "Very useful" level, the highest percentage is for Object-

oriented Programming, which is 40.5%, and the lowest percentage is for v, which is 9.5%.

Table 4.8 is the mean and standard deviation of the professional compulsory courses.

Table 4.8: Mean and Standard Deviation of the Professional Compulsory Courses

Professional compulsory courses	Mean	Std. Deviation	N
Object-oriented Programming	4.93	1.135	42
Data structure and algorithm	4.93	1.113	
Computer network	4.81	1.018	
Operating system	4.71	1.088	
Principles of Computer Organization	4.69	1.220	
Discrete mathematics	4.52	1.194	
	(4.36-5.19)		
Digital logic circuit	3.64	1.394	
	(3.52-4.35)		

According to Table 4.8, in the professional compulsory courses, the mean of the Digital Logic Circuit is the lowest, mean is 3.64, which belongs to the "Rather useful" level (range 3.52 ~ 4.35). The mean of the remaining courses is between 4.52 and 4.93, which belongs to the "Useful" level (range 4.36 ~ 5.19).

In summary, according to the survey of students, students believe that the professional required courses are not directly helpful for improving the employability

of students. Among the seven professional courses required by students, digital logic circuits belong to the "Rather useful" level, and the other courses belong to the "Useful" level. Professional compulsory courses play a role in inheriting and inspiring in the computer science curriculum system.

#### 4.4.3 Analysis of Professional development courses

The professional development courses are mainly operation courses. This section studies the usefulness of the 14 courses required for professional development courses. The scale is used for research. Figure 4.5 shows the usefulness of the 14 professional development courses.

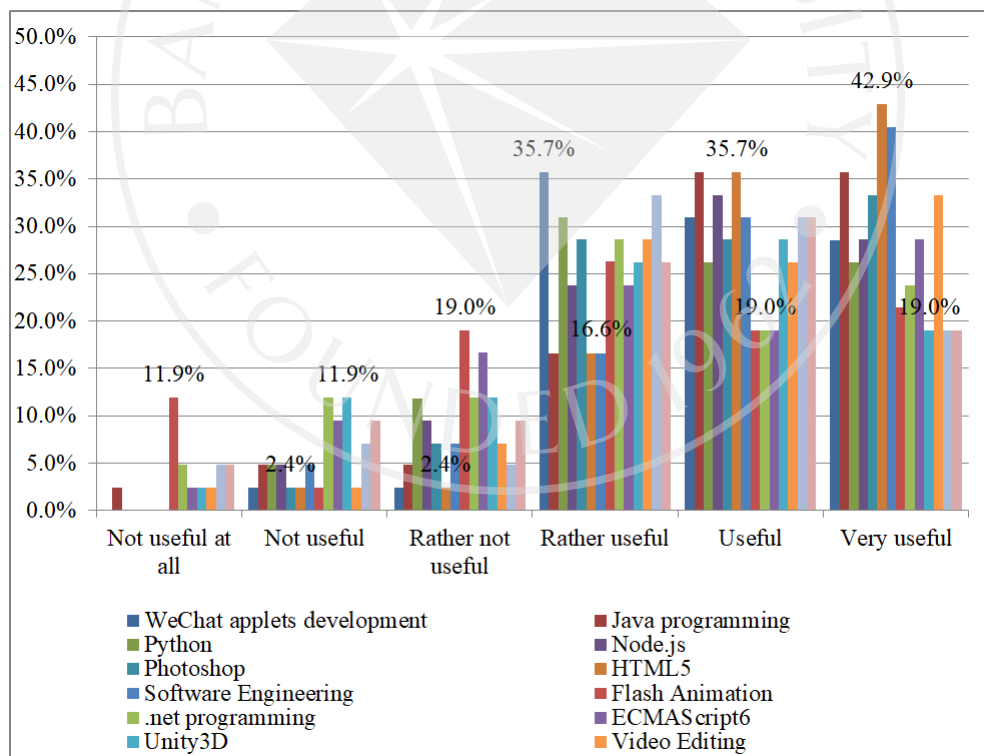


Figure 4.5: Comparison of the Importance of the 14 Professional Development courses

According to Figure 4.5, in the "Not useful at all" level, the Flash Animation accounted for the highest proportion, at 11.9%, and there are six courses with a percentage of 0, they are WeChat applets development, Python, Node.js, Photoshop, HTML5 and Software Engineering. In the "Not useful" level, the highest percentage is for .net programming and Unity3D, which are both 11.9%, and the lowest percentage is for WeChat applets development, Photoshop, HTML5, Flash Animation and Video Editing, which are all 2.4%. In the "Rather not useful" level, the highest percentage is for Flash Animation, which is 19.0%, the lowest percentage is for WeChat applets development and HTML5, which are both 2.4%. In the "Rather useful" level, the highest percentage is for WeChat applets development, which is 35.7%, the lowest percentage is for Java Programming, HTML5 and Software Engineering, which are all 16.6%. In the "Useful" level, the highest percentage is for Java Programming and HTML5, which are both 35.7%, the lowest percentage is for Flash Animation, .net programming and ECMAScript6, which are 19.0%. In the "Very useful" level, the highest percentage is for HTML5, which are both 42.9%, the lowest percentage is for Unity 3D, ReactJS and AngularJS, which are 19.0%.

Table 4.9 is the mean and standard deviation of the professional development courses.

Table 4.9: Mean and Standard Deviation of the Professional Development Courses

Public course	Mean	Std. Deviation	N
HTML5	5.14	0.952	42
Software Engineering	4.95	1.147	
Java programming	4.86	1.241	
Photoshop	4.83	1.057	
WeChat applets development	4.81	0.969	
Video Editing	4.74	1.211	
Node.js	4.71	1.132	
Python programming	4.57	1.151	
ReactJS	4.36	1.322	
	(4.36-5.19)		
ECMAScript6	4.33	1.426	42
AngularJS	4.26	1.398	
Unity3D	4.24	1.358	
.net programming	4.17	1.480	
Flash Animation	4.02	1.569	
	(3.52-4.35)		

Table 4.9 shows the mean of 14 professional development courses, which are divided into two different intervals according to the mean ranking from high to low. The first interval is from 4.36 to 5.14, and the courses in this interval belong to the "Useful" level (range 4.36 ~ 5.19). They are HTML5, Software Engineering, Java

programming, Photoshop, WeChat applets development, Video Editing, Node.js, Python programming and ReactJS. The second interval is from 4.02 to 4.33, and the courses in this interval belong to the "Rather useful" level (range 3.52 ~ 4.35). They are ECMAScript6, AngularJS, Unity3D, .net programming and Flash Animation.

In professional development courses, .net programming and Flash Animation belong to the "Rather useful" level, but they should be removed because of outdated technology. In the remaining courses, nine courses belong to the "Useful" level, and three courses belong to the "Rather important" level. It can be concluded that operation courses are helpful to improve students' employability.

#### 4.4.4 Analysis of Computer Science Emerging Technology

This part studies the usefulness of computer science emerging technology courses to improve students' employability. These emerging technologies are artificial intelligence, big data technology, cloud computing technology and blockchain technology. The scale is used for research. Figure 4.6 shows the usefulness of the four emerging technology courses.

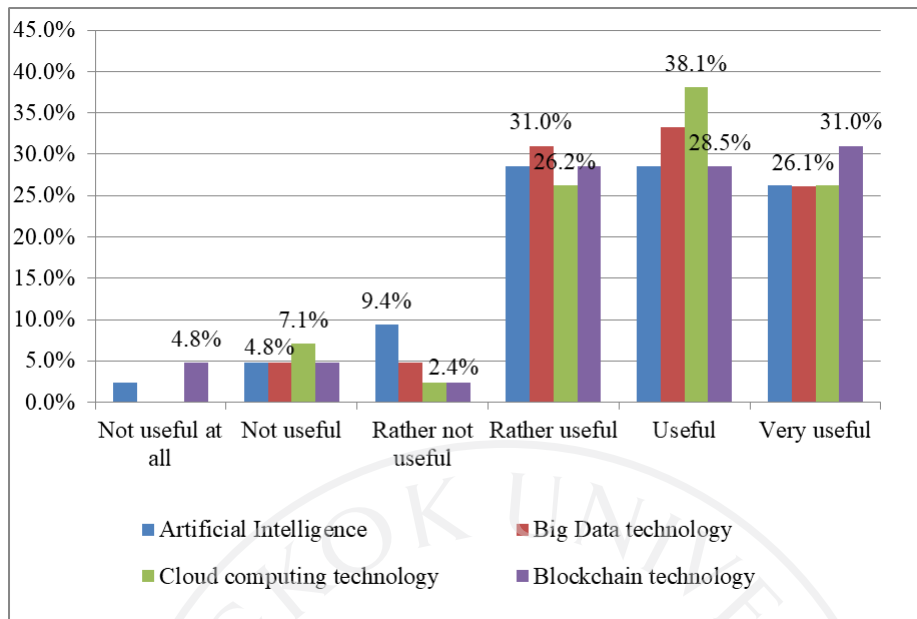


Figure 4.6: Comparison of the Importance of the Four Emerging Technology courses

According to Figure 4.6, in the "Not useful at all" level, the Blockchain technology for the highest proportion, at 4.8%, and there are two courses with a percentage of 0, they are Big Data technology and Cloud computing technology. In the "Not useful" level, the highest percentage is Cloud computing technology, which is 7.1%, and the remaining three courses are all 4.8%. In the "Rather not useful" level, the highest percentage is Artificial Intelligence, which is 9.4%, the lowest percentage is Cloud computing technology and Blockchain technology, which are both 2.4%. In the "Rather useful" level, the highest percentage is Big Data technology, which is 31.0%, the lowest percentage is Cloud computing technology, which is 26.2%. In the "Useful" level, the highest percentage is Cloud computing technology, which is 38.1%, the lowest percentage is Blockchain technology, which is 28.5%. In the "Very



useful" level, the highest percentage is Blockchain technology, which is 31.0%, the lowest percentage is Big Data technology, which is 26.1%.

Table 4.10 is the mean and standard deviation of the emerging technology courses.

Table 4.10: Mean and Standard Deviation of the Emerging Technology Courses

Emerging technology courses	Mean	Std. Deviation	N
Cloud computing technology	4.74	1.106	42
Big Data technology	4.71	1.066	
Blockchain technology	4.64	1.340	
Artificial Intelligence	4.55	1.253	
	(4.36-5.19)		

According to Table 4.10, the average of the four emerging technology courses in computer science is between 4.55 and 4.74, which belongs to the "Useful" level (range 4.36 ~ 5.19).

As can be seen from Figure 4.4, the three "useful" bars in the figure are significantly higher than the three "not useful" bars. This shows that students are eager to open courses in emerging technologies of computer science.

#### 4.5 Overall Analysis of the Curriculum System

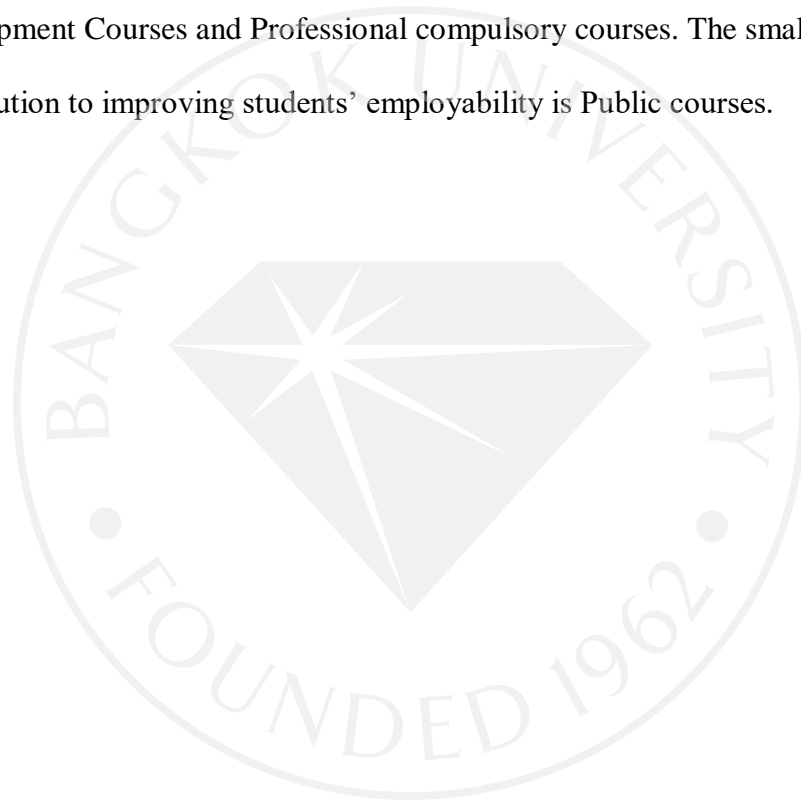
Table 4.11 calculates the mean of each part of courses to find the degree of influence of each part on improving students' employability.

Table 4.11: The Mean of Each Part of Courses

	Public courses	Professional compulsory courses	Professional Development Course	Emerging technology courses	Practical courses
	4.4	4.93	5.14	4.74	5.26
	4.33	4.93	4.95	4.71	5.19
	4.05	4.81	4.86	4.64	5.14
	3.9	4.71	4.83	4.55	5.07
	3.76	4.69	4.81		5.02
	3.6	4.52	4.74		4.59
		3.64	4.71		4.88
			4.57		4.88
			4.36		4.6
			4.33		
			4.26		
			4.24		
Mean	4.01	4.60	4.65	4.66	4.95

According to Table 4.11, the mean of public courses is the lowest (4.01), the mean of practical courses is the highest (4.95). Professional compulsory courses (4.60), Professional Development Course (4.65) and Emerging technology courses (4.66) are somewhere in between.

It can be seen that Practical courses are the most helpful for improving the employability of students, followed by Emerging technology courses, Professional Development Courses and Professional compulsory courses. The smallest contribution to improving students' employability is Public courses.



## **CHAPTER 5**

### **FINDING AND CONCLUSION**

This chapter is summarized of total research finding and discussion comparing the results with previous research as the main part, with research suggestions and solutions for the problems based on the finding in the analysis, and suggestions on the construction of computer science curriculum system at Baise University.

#### **5.1 Summary of Research**

This study found that the computer science curriculum system of Baise University is composed of five parts: public courses, professional basic courses, professional core courses, professional development courses and practical innovation courses. The curriculum system is relatively complete, but in order to improve the employability of students, the curriculum system needs to be improved.

5.1.1 Qualitative research found that students generally put forward the following points:

- 1) There are too many theoretical lessons and too few practical lessons.

The students hope to reduce theory hours and increase practical hours.

- 2) The techniques taught in some professional courses are outdated, such as Flash animation production, .net programming, Dreamweaver web page production and other technologies have now been eliminated, and the school still requires them to learn these technologies. They hope professional courses are consistent with social needs.

3) Through interviews with students, I learned that most of their freshmen and sophomores are studying some public courses, and professional courses start late. They hope the start of the professional class should not too late. For example, most students mentioned that basic programming courses (C language programming) should be offered in freshman year, so that other professional courses can start early.

4) Some courses are repeated. For example, database management technology opens MySQL, Oracle and SQL Server at the same time. For example, let an engineer or lecturer from a company come to teach students.

5) Students said that the teachers in the school mainly focus on theories, they hope teachers with practical experience come to class.

6) Students say that some professional compulsory courses are useful, they hope to retain some of the previous excellent professional compulsory courses.

7) Students have great expectations for new technology courses. They hope that some new technology courses will be offered, such as artificial intelligence, big data technology, cloud computing technology and blockchain technology.

8) Students think that being able to participate in the development of a complete project at school is very helpful to improve their employability. They hope that school year design classes be set up to give students the opportunity to participate in a complete project development.

5.1.2 In quantitative research, questionnaires were distributed to employers and students. The following are the findings after taking back the questionnaire.

1) After a survey of employers, found that they do not value the professional knowledge that students have learned in school, they pay more attention to other abilities of students, such as abide by unit discipline and national laws and

regulations, integrity and loyalty to the unit, explorative spirit at work, professionalism at work, observe professional ethics, innovative spirit at work and related capabilities, cooperative communication skills, and so on.

2) The questionnaire survey for students is divided into three parts. These questions mainly investigate the computer science curriculum system of Baise University.

- The analysis of public courses found that public courses are not very helpful for improving students' employability. Among the public courses analyzed, only Lectures on etiquette management is at the level of "Useful", and the other courses are at the level of "Rather useful".

- Students believe that professional compulsory courses cannot directly help to improve students' employability. Among the seven compulsory courses surveyed, digital logic circuits belong to the "quite useful" level, while other courses belong to the "useful" level. Although professional compulsory courses cannot directly improve students' employability, professional compulsory courses are the basis of other professional courses, and these courses are reserved for compulsory courses.

- Professional development courses mainly consist of some operation courses. In the professional development classes surveyed, .net programming and Flash Animation belong to the "quite useful" level, but they should be removed because the technology is outdated. Among the remaining courses, nine courses belong to the "useful" level, and three courses belong to the "very important" level. It can be concluded that the operation course helps to improve the employability of students.

- In a survey of emerging technology courses in computer science, students mentioned artificial intelligence, big data technology, cloud computing technology, and blockchain technology. These courses belong to the "Useful" level. Students believe that mastering emerging technologies in computer science will help improve their employability.

For the question: "Overall, how would you rate the prospects of student employability (= chances for a undergraduate student to find a good job after completing their studies in the program) of the current Computer Science course curriculum at Baise University?" This is an overall evaluation of the curriculum system. For this problem, 50% of students choose "Rather high", and only 16.7% of students choose "Very high". It means that the current curriculum is not very helpful for students' employment prospects. The curriculum needs to be improved.

## **5.2 Suggestions**

In summary, the following suggestions are made for the improvement of Baise University's computer science curriculum system.

5.2.1 Increase practical courses and practical hours, so that students have practical experience before graduation to improve their employability.

5.2.2 Set up design courses for the school year to give students the opportunity to participate in complete project development to accumulate practical experience.

5.2.3 Keep some compulsory courses with excellent specialties, such as the principle of computer composition, operating system, data structure and algorithm, computer network, programming foundation, etc.

5.2.4 Remove repeated courses, such as database technology to open MySQL.

5.2.5 Set up professional courses early. For example, the basics of programming should be set up in the first semester of freshman year, and other core courses of majors should be set up in the first semester and sophomore semester, so that other professional development courses can start in the second semester of sophomore year.

5.2.6 Remove some outdated technical courses and use new technology courses instead. For example, Unit 3D replaces Flash animation, HTML5 replaces Dreamweaver, and Java replaces .NET programming.

5.2.7 Enterprise engineers or lecturers are invited to give students some practical courses.

5.2.8 Appropriately set up some new technology courses to let students understand the emerging technologies of the computer industry.

5.2.9 Set up some legal courses or creative leadership courses in public courses to improve students' comprehensive ability.

### **5.3 Limitations**

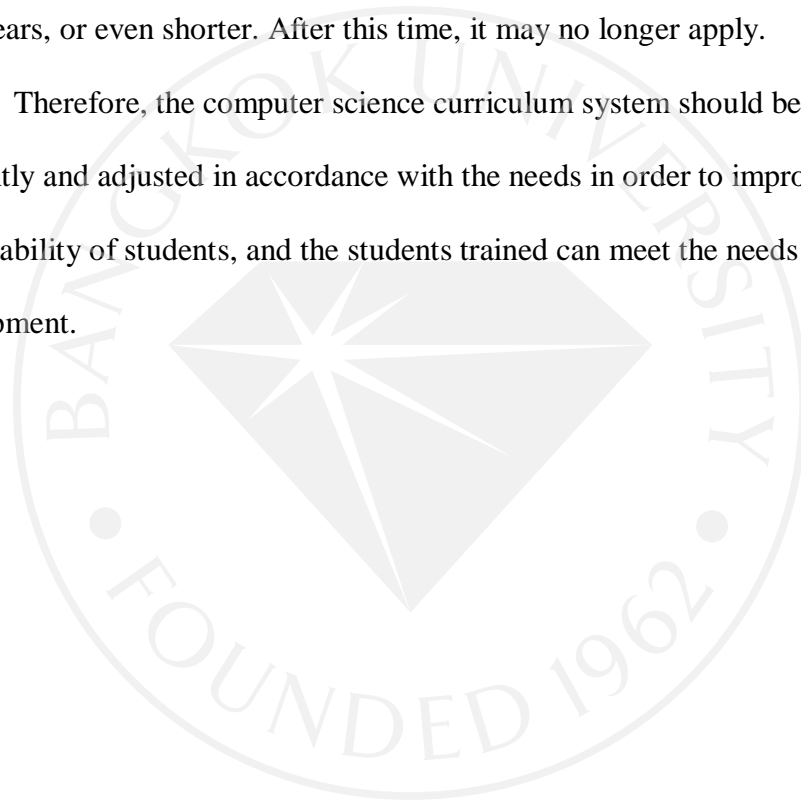
This study conducted two rounds of interviews with four students. A questionnaire survey was conducted on 10 employers and 42 students. This range is small and cannot represent all employers and all computer science students at Baise University.

From a computer professional perspective, whether it is hardware or software, the speed of updating is very fast. In terms of hardware, Moore's Law states:



"When the price is unchanged, the number of components that can be accommodated on the integrated circuit will double every 18 to 24 months, and the performance will double." In terms of applications, it may take only one year for some software versions to be updated from an old version to a new version. The hardware and software are updated so fast that the techniques learned may easily become outdated. Therefore, some of the above suggestions may only be suitable for the next two or three years, or even shorter. After this time, it may no longer apply.

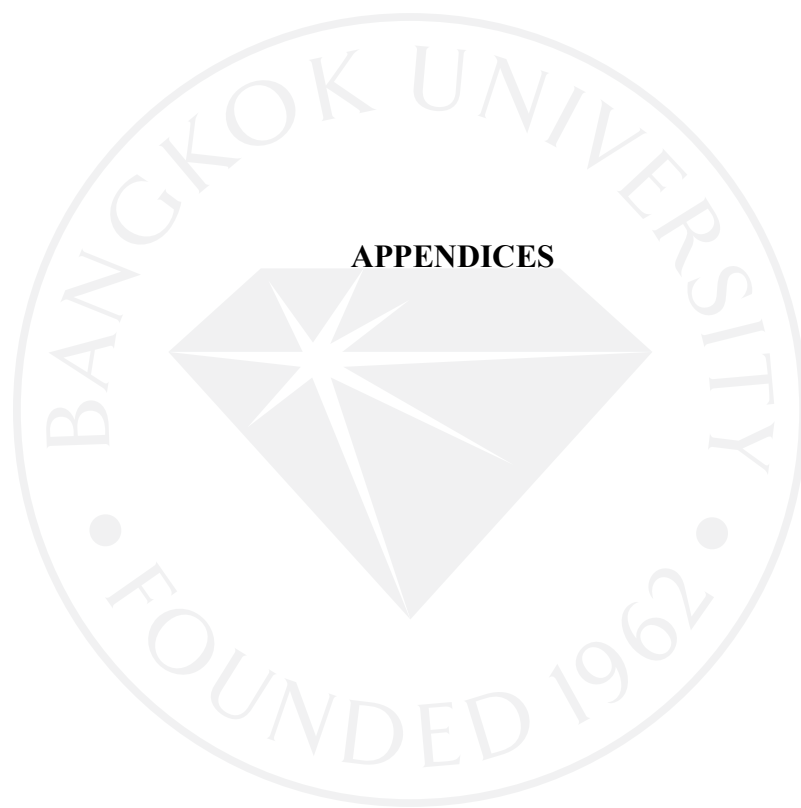
Therefore, the computer science curriculum system should be studied frequently and adjusted in accordance with the needs in order to improve the employability of students, and the students trained can meet the needs of social development.



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## Appendix A

### Interview Questionnaire



**Master in  
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Interview Questionnaire on Investigating Student Perceptions on the Impact of the Course Curriculum of a Computer Science Program on Bachelor Students' Future Employability: A Case Study at Baise University

Ladies and gentlemen,

I am a student of Bangkok University, major in Master of Business Innovation. Order to finish my Independent Study (IS) "Investigating Student Perceptions on the Impact of the Course Curriculum of a Computer Science Program on Bachelor Students' Future Employability: A Case Study at Baise University", I would like to make an interview to you about the relationship between curriculum setting and employability. I need your cooperation, thanks a lot.

I promise that the content of the interview will only be used for studying, not for any business purposes, and I will remain confidential.

Name:            Gender:            Age:

Date (DD/MM/YYYY):

Index	Questions	Answers	备注
Q1	Based on your personal work and career development plans, what kind of course knowledge do you need?		
Q2	What inspiration or gains did you get from the courses learned at the university?		
Q3	What course do you find most interesting and most helpful to you? Why? How to use it in your work?		
Q4	What courses do you think is the least interesting and does not help you? Why?		
Q5	What do you think are the shortcomings of your university curriculum?		
Q6	What kind of improvements would you like to see in the program? Why?		
Q7	What NEW courses would you like to see in the program? Why?		

## Appendix B

### Respondents' Raw Recorded Data



QUESTION 1: Based on your personal work and career development plans, what kind of course knowledge do you need? Why?

Respondent 1: Huang Jieli, Female, 22Y

LiFen: Thank you for accepting my interview. Now I want to ask you a few questions. Please answer them truthfully and try to answer them in more detail. The first question is: What inspiration or gains did you get from the courses learned at the university? Why?

Huang: I am currently working on front-end development. The courses I need include WeChat applets (1.1.1, Respondant1, Question 1, Keyword 1), Vue (1.1.2) framework, React-native (1.1.3) framework, advanced JavaScript (1.1.4) programming, computer network (1.1.5) knowledge, and NodeJS (1.1.6). Because the front-end design employment is not just a simple knowledge of HTML and CSS, but the need to write code and then cooperate with the back-end server logic development. Now the requirements for the front end are getting higher and higher. (1.1.7) The course requires front-end knowledge and back-end knowledge.

Respondent 2: Liang Guilan, Female, 22Y

LiFen: Thank you for accepting my interview. Now I want to ask you a few questions. Please answer them truthfully and try to answer them in more detail. The first question is: What inspiration or gains did you get from the courses learned at the university? Why?

Liang: I need Photoshop (2.1.1), AI (2.1.2), Database (2.1.3), Web Page Creation (2.1.4), C4D (2.1.5) knowledge, because my future career is designer. I think these are very important knowledge.

LiFen: What kind of designer?

Liang: UI front-end design or e-commerce.

LiFen: What technology is C4D?

Liang: This is a 3D modeling technology software.

LiFen: what's it for?

Liang: It is used to make some special pages. For example, some activities on Taobao or Tmall require some special pages (for publicity). These special pages are made with C4D.

LiFen: Do you have a project now?

Liang: I do not have one, but I've seen one before.

LiFen: Have you learned what kind of work your classmates are going to do after graduation?

Liang: Probably engaged in Java, front-end design, civil servants, teachers, etc.

LiFen: Do you have anything to add to this question?

Liang: I think HTML5 (2.1.6) and CSS3 (2.1.7) are also very helpful to us.



Lifen: Are these all front-end design techniques?

Liang: Yes, front-end design, we have to learn these design. System handover will be more convenient.

Respondent 3: Pan Yuqin, Female, 22Y

Lifen: Thank you for accepting my interview. Now I want to ask you a few questions. Please answer them truthfully and try to answer them in more detail. The first question is: What inspiration or gains did you get from the courses learned at the university? Why?

Pan: As a computer science student, I want to be a front-end engineer or front-end architect. The courses I need are: HTML5 (3.1.1), Photoshop (3.1.2) (for cutting pictures and drawing pictures when making web pages), JavaScript (3.1.3) (for dynamic interface operations), Node.js (3.1.4) (front-end server language), Github (3.1.5) and Gitee (3.1.6) and SVN (3.1.7) project managers. I also need knowledge of mainstream frameworks at the front end: Angular (3.1.8), React (3.1.9), Vue (3.1.10). I think most of the existing courses in our major are tending to the back end, such as database and Java programming. But I use Photoshop in my work unfortunately we did not open this course. At present, the mainstream frameworks of the front end are Angular, React and Vue, but we have not learned these three mainstream frameworks in school. Now that we come to society, it is equivalent to we need to re-learn these contents now. There is also JavaScript (for the operation of dynamic interfaces) script speech that also needs to be re-learned. This will waste a little time for us.

LiFen: Please talk about JavaScript.

Pan: JavaScript is a scripting language that is a front-end technology. I need knowledge of HTML5. I learned H5 (HTML5) in school, but I didn't learn much in school. It's useless and requires more in-depth study.

LiFen: Have you never studied Photoshop at school?

Pan: I have never studied Photoshop in school. This is a pity. Because the front-end work needs a little picture processing. Like my current lecturer, he sometimes makes some PSP pictures for us, but I don't know how to do it. I need to spend a lot of time to deal with it, but still not very good.

LiFen: You mentioned Github, can you explain?

Pan: Github is a project management technology. For example, you are currently in Thailand, and I am in China. The two of us work on a project at the same time. You do the back end, and I do the front end. If we all have a Github account, I will put the finished page on Github, you can download my page directly there, if I am modified on this side, Github will prompt you where there are modifications on the front end. Then you know that your backend may change. This way we can jointly develop a project through Github.

Lifen: Do you have anything to add to this question?

Pan: No, that's all.

Respondent 4: Wan Jinrun, Male, 21Y

LiFen: Thank you for accepting my interview. Now I want to ask you a few questions. Please answer them truthfully and try to answer them in more detail. The

first question is: What inspiration or gains did you get from the courses learned at the university? Why?

Wan: I need new knowledge. This can better meet social needs.

LiFen: What kind of knowledge?

Wan: Such as 3D animation technology (4.1.1).

LiFen: Are you internship or work?

Wan: My internship is over. I am looking for a job.

LiFen: What kind of work did you do during your internship?

Wan: New media applications.

LiFen: What exactly do you do?

Wan: A lot of. For example, processing data, writing Baidu entries, and sometimes doing some animation.

LiFen: What kind of work will you do in the future?

Wan: New media applications. Such as video production, copywriting and other tasks. Similar to short vibrato video, there are videos with copywriting.

LiFen: I understand. What type of company does this job belong to?

Wan: Advertising company.

LiFen: Ok. This is the first question. We will continue to the second question soon.



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Question 2: What inspiration or gains did you get from the courses learned at the university?

Respondent 1: Huang Jieli, Female, 22Y

Lifen: The second question is: What inspiration or gains did you get from the courses learned at the university?

Wang: Some knowledge required for programming and some theoretical knowledge. (1.2.1) Theoretical courses are important, and many underlying principles require a lot of theoretical knowledge. If you want to make higher progress, you need to practice (1.2.2) in addition to theoretical courses. We need to convert what we have learned from the textbook into code to achieve the effect we need.

Lifen: What are the gains?

Wang: The gains seem to be very little.

Lifen: Are you sure? You have studied for four years.

Wang: The gain may be..., for example, the Principles of Computer Composition and Computer Network courses, these courses are not very related to our programming development, but if you learn this knowledge, you can develop to a higher level, rather than just In terms of programming. And that's all.

Lifen: Ok. I will save this recording first.

Respondent 2: Liang Guilan, Female, 22Y

Lifen: The second question is: What inspiration or gains did you get from the courses learned at the university?

Liang: I learned a lot of theoretical knowledge (2.2.1) in college, and I know more about the theoretical knowledge of many courses, but **less** practice (2.2.2).

Lifen: Is there anything?

Wang: No.

Lifen: Do you mean that there is more theoretical knowledge to study at university, and then the other (practice) is less?

Liang: Yes.

Respondent 3: Pan Yuqin, Female, 22Y

Lifen: Next is the second question. The second question is: What inspiration or gains did you get from the courses learned at the university?

Pan: First of all, I think the world of code is very rigorous and boring. Because when we learned Java and C, I didn't know it would look like this. This thing is like mathematics, sometimes it will be very irritable to add more and less more. Secondly, the programming is the same, whether it is C language, Java, JavaScript or H5, in fact, it is the same. I think the code is the same. The third is that I think the school year design (3.2.1) and practice (3.2.2) are also very important. In this process, I can accumulate some experience. This is project experience, which is very important in work.

Lifen: What is the school year design?

Pan: This is a sophomore or junior course. At that time, Mr. Huang Aiqing

gave us a lecture, gave us a task, and let us complete a small management system. In order to complete the task, I went to various places to find materials. Although I only made a semi-finished product, this was very important to us. In the process, I accumulated some experience in project.

Lifen: Okay, please continue.

Pan: Although professional knowledge (3.2.3) is important, physical education (3.2.4) is also very important. If you are not in good health, you often take time off, which also affects the learning of professional courses. Learning must be a combination of work and rest, and professional knowledge must not be lost or lack of exercise.

Lifen: Is there anything else?

Pan: I think online courses (3.2.5) are also very important. When I was a freshman, there was an online elective course on WeChat. I was very interested in how to become a qualified WeChat and how to avoid being cheated. Every time I take a class seriously, I am laughed at by my roommate. I would also like to say that I used to be the minister of the etiquette department of the college. I took some etiquette management courses (3.2.5) and taught them to my younger students. I think this course is also very important. It is very helpful to improve people's self-confidence.

Lifen: Do you have anything to add to this question?

Pan: No.

Lifen: OK, thank you.

Respondent 4: Wan Jinrun, Male, 21Y

Lifen: Next is the second question. The second question is: What inspiration or gains did you get from the courses learned at the university?

Wan: The enlightenment is to understand the development and direction of the computer industry, but also gained knowledge of many theoretical courses (4.2.1). For example: Programming language, Database, Computer Network , Software Engineering, Data structure, Operating System and Computer Composition Principle.

Lifen: Do you think that some basic courses such as: data structure, operating system and computer composition principles, etc., are helpful to your work?

Wan: Yes, it is possible to build up because of the foundation.

Lifen: What about software engineering, computer network courses and databases?

Wan: Yes, they have.

Lifen: Do you have anything to add to this question?

Wan: NO.



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Question 3: What course do you find most interesting and most helpful to you?

Why? How to use it in your work?

Respondent 1: Huang Jieli, Female, 22Y

Lifen: The third question is: What course do you find most interesting and most helpful to you? Why? How to use it in your work?

Huang: The most interesting should be the practice of WeChat applet (1.3.1). You can build a WeChat applet in a short time, and you can see the effect quickly.

Lifen: Does the WeChat applet help you to do front-end work now?

Huang: WeChat applet is a must-have skill for the front end. Many front-end job interviews require familiarity or experience in WeChat applet development.

Lifen: When did you take this class?

Huang: It was opened in the second semester of junior year. Started a week of practical classes.

Lifen: Have you been taking this class all week?

Huang: No, we study in our spare time.

Lifen: Who was your teacher?

Huang: Corporate lecturer outside the school.

Lifen: What is the most helpful class for your job?

Huang: The most helpful course for my job is Java programming (1.3.2).

Because if you are engaged in front-end work, you must also be familiar with a back-



end programming language, which can be Java, Python (1.3.3), C language programming (1.3.4), PHP (1.3.5), or Nodejs (1.3.6).

Lifen: Can you explain?

Huang: Familiar with the back-end programming language can better co-develop front-end and back-end. If you only have front-end knowledge and not back-end knowledge, you may have difficulty communicating with the back-end.

Respondent 2: Liang Guilan, Female, 22Y

Lifen: The third question is: What course do you find most interesting and most helpful to you? Why? How to use it in your work? There are two issues involved here: the most interesting and the most helpful.

Liang: The web production course (2.3.1) is very helpful ...

Lifen: There was a problem with the Internet just now. Are you talking about webpage making?

Liang: Yes. The web interface can be optimized, and dynamic ones can also be done. It is very helpful for page layout, and it can be well displayed for work. The web production course is also helpful for future work. Photoshop (2.3.2) we haven't studied at school, but I have studied it by myself before, and I think it is useful.

Lifen: What techniques do you use to make web pages in school?

Liang: HTML5 (2.3.3) is currently used in web page production. But the book we use is Dreamweaver. Dreamweaver (2.3.4) technology is no longer used.

Lifen: When did you get in touch with H5?

Liang: I was exposed to HTML5, a training company outside the school.

Lifen: Which of these two technologies do you use more?

Liang: HTML5.

Lifen: Do you have anything to add to this question?

Liang: No.

Respondent 3: Pan Yuqin, Female, 22Y

Lifen: The third question is: What course do you find most interesting and most helpful to you? Why? How to use it in your work? There are two issues involved here: the most interesting and the most helpful.

Pan: The practical training courses (3,3,1) at the end of each semester are the most helpful. For example, the last semester was a course taught by a corporate lecturer. It was a Vue practical class. At that time, I only completed a semi-finished product, but the first contact Separate technology to the front end and back end. Our teachers in this college are very theoretical in their lectures, but they are rarely practical. I feel that our teacher in this college also teaches us to knock the code, but the code he teaches is all in the textbook, we feel very boring. Feeling that the teacher talks about the teacher, we learn from us, which makes it even more boring. Teachers from training institutions come to teach me, and they will find a way to be close to you, very kind and very humorous. We are easily attracted to them. The technology they use when they take us to do projects is the latest technology. For example, they teach us the WeChat applet, which is a very hot thing in recent years. There is another teacher who teaches us the student management system of face recognition technology, but because the equipment of the school is not good, we are not allowed to do face recognition. This technology is also very advanced and belongs to the content of artificial intelligence (3.3.2). Enterprise lecturers come to

take our project to be more practical. We also learned C language, Java, software engineering in school, including the computer service course of teacher Luo Jianming, but he did not personally take us to do the project, he let us watch the video ourselves. The teacher of the enterprise will take us to do the project (3.3.3). If there is a bug, he will solve it with us. Although this practical class is only a week, we have gained a lot.

Lifen: Do you think practice classes are very, very important?

Pan: Yes, I think so, practical class is very important. We have learned a lot of theoretical courses.

Lifen: Do you think theory courses are helpful for your work?

Pan: I think the Software Engineering (3.3.4) class is helpful, there are many figures in it. Later, when we do demand analysis, including front-end development and background management, we must look at customer needs.

Lifen: What is your current job?

Pan: I am still training, but my future job should be a front-end engineer or front-end architect.

Lifen: Do you have anything else to say?

Pan: Our school should have more practical training courses (3.3.5). If we do so, our younger students will be grateful. Because I understand that they are trained at the end of each semester at Guilin University of Electronic Technology. They have to train for one month each semester. That's all I have to say about this issue.

Lifen: OK.

Respondent 4: Wan Jinrun, Male, 21Y

Lifen: The third question is: What course do you find most interesting and most helpful to you? Why? How to use it in your work? There are two issues involved here: the most interesting and the most helpful.

Wan: The new media courses (4.3.1) are very helpful, and you will know how to apply the small video after contact, including shooting methods, design plots and the like.

Lifen: What class is the small video?

Wan: This is our final training class, similar to the short video production.

Lifen: Is that a school class or an off-campus training course?

Wan: The school invites teachers outside the school to attend classes.

Lifen: I understand, the school invites lecturers from enterprises to come and give lectures to you?

Wan: Yes, this class is also a kind of practice class (4.3.2), it is very useful.



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Question 4: What courses do you think is the least interesting and does not help you?

Why?

Respondent 1: Huang Jieli, Female, 22Y

Lifen: The fourth question is: What courses do you think is the least interesting and does not help you? Why?

Huang: For professional courses, I think Flash Animation (1.4.1) is the most useless. Because the Flash technology is now behind. No company uses Flash technology. Google has given up support for Flash in 2020. The function of playing video directly with HTML5.

Lifen: What about public classes?

Huang: The public class (1.4.2) didn't feel helpful. For example, Military Management (1.4.3) and Mental Health Education (1.4.4) are useless.

Lifen: What about philosophy?

Huang: Philosophy classes are not helpful for employment, but they are necessary.

Lifen: Is there anything else to say?

Huang: No.

Respondent 2: Liang Guilan, Female, 22Y

Lifen: The fourth question is: What courses do you think is the least interesting and does not help you? Why?

Liang: Digital Logic Circuit (2.4.1) is one of them. I don't think it helps me much in my work. Because the content is related to circuits, currents, etc., I think the teachers in this course are very boring, and there are not many experiments. They are always talking about theory, but they don't understand.

Lifen: Was it boring because it didn't understand, or was it boring because it was useless?

Liang: It is not very useful for our work. I think circuits are things to learn from physics.

Lifen: Do you think this course is unnecessary?

Liang: I don't think it is necessary.

Lifen: This course is a pre-professional course for some majors. For example, the third chapter of the principle of computer composition requires knowledge of circuits. If you do not start this course, do you think you can understand the third chapter of the principle of computer composition?

Liang: It is not necessary as a course. You can add some class hours when you are on the principle of computer composition.

Lifen: Are there any courses other than this course that are useless?

Liang: I have no idea about it.

Lifen: You have a lot of courses. In addition to professional courses, there are public courses. Which public courses are not helpful to you?

Lifen: Career Guidance courses (2.4.2) are helpful. The teacher talked a lot and it was very helpful for finding a job in the future.

Liang: What courses are there?

Liang: No.

Lifen: OK.

Respondent 3: Pan Yuqin, Female, 22Y

Lifen: The fourth question is: What courses do you think is the least interesting and does not help you? Why?

Pan: I think the Digital Logic Circuit (3,4,1) course is the most unhelpful. In fact, I still can't remember what that course was taught. I vaguely remembered that it seemed that Teacher Huang Kewen gave us classes. During the class, he mainly talked about theory, few practical classes, and no chance to do experiments. Digital logic circuit feels like a course in physics. I think this course feels good and boring. It has not helped us in our work afterwards. Computer science students are mainly engaged in software after graduation, and few direct hardware development. Especially I am a girl, I do not like this kind of thing (circuit) very much.

Lifen: In your circuit course, in addition to digital logic circuits and analog logic circuits, does analog circuits help your work?

Pan: I have no impression of analog logic circuits. When we went to the experiment for the first time, our head manager burned all the circuit board lights. Later, there was no experiment class in this class.

Lifen: Let me explain: the circuit class does not necessarily have any direct help to the work it is the pre-curriculum as a successor of some courses. For example,

circuits are used in the principles of computer composition. If you do n't learn the circuit class first, can you understand the content of the computer composition principle course?

Pan: But we have a course called Discrete Mathematics, and some of the content here is similar to the content of the computer composition principle course. Therefore, I think that digital logic circuit is unnecessary, because it is too boring.

Lifen: Are there any other courses?

Pan: I can't think of it for now.

Lifen: How about public classes?

Pan: I think Marxist Philosophy (3,4,2) has not helped me much. Those classes are only useful for graduate students and party members. I don't want to be a graduate student and I don't want to join the party, so it doesn't do much to me. I have no needs in this regard.

Respondent 4: Wan Jinrun, Male, 21Y

Lifen: The fourth question is: What courses do you think is the least interesting and does not help you? Why?

Wan: I think video production courses are not helpful, and the techniques taught by teachers are old-fashioned (4,4,1). The special effects taught in the class are all technologies that have been eliminated by society and cannot be helped in practical work.

Lifen: Just now you told me that your work has produced short videos, but now you say that video production classes are useless. Can you explain?



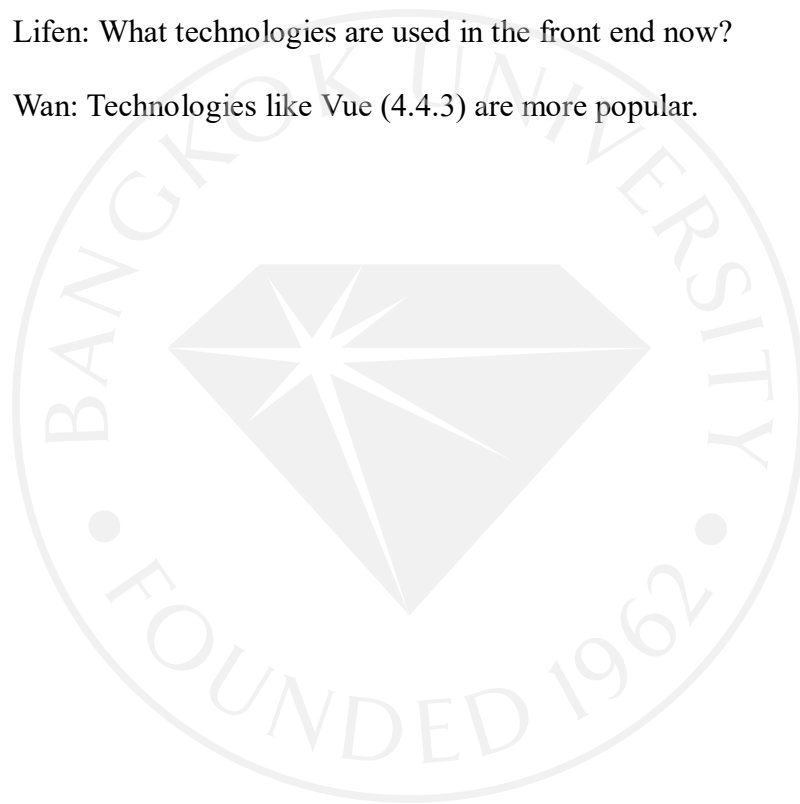
Wan: It's not that the video production course is useless, it's that the knowledge taught by the teacher in this course is outdated and useless (4.4.1).

Lifen: Is there any course other than this?

Wan: There is also . net course (4.4.2) that is useless. This is an old technology, and it is no longer needed. Now the front end does not use these technologies.

Lifen: What technologies are used in the front end now?

Wan: Technologies like Vue (4.4.3) are more popular.





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Question 5: What do you think are the shortcomings of your university curriculum?

Respondent 1: Huang Jieli, Female, 22Y

Lifen: The fifth question is: What do you think are the shortcomings of your university curriculum?

Huang: The first is that there are too few practical lessons (1.5.1) and too many theoretical lessons (1.5.2). Moreover, some courses are relatively backward, and they do not talk about new technologies. For example, Dreamweaver (1.5.3) is still used in web page production.

Lifen: DreamWeare?

Huang: Yes, that is the software, no one uses it anymore.

Lifen: Do you still have web-making classes?

Hhuang: Yes, there are webpage making lessons. The web design course was still developed using Dreamweaver a long time ago. It does not involve the new knowledge points of HTML5 (1.5.4) and the syntax of ECMAScript6 (1.5.5). The web design does not use JavaScript (1.5.6).

Lifen: You mentioned Python and Nodejs in the third question, can you tell me?

Huang: We should get to know Python, because many high-end jobs are now done with Python (1.5.7). I think we should get to know it, and we can't know anything about it. Nodejs is not a programming language, it can run on the editing

machine combined with JavaScript technology.

Lifen: You also mentioned Unity3D, please talk about it.

Huang: Unity3 (1.5.8) is used to make games, and now many game companies will use this technology. It is said that the sophomore girl now has this course, but we do not have it. We don't even have PS.

Lifen: Do you know PS technology?

Huang: No, I cannot PS.

Respondent 2: Liang Guilan, Female, 22Y

Lifen: The fifth question is: What do you think are the shortcomings of your university curriculum?

Liang: The biggest disadvantage is that there are too many theoretical courses (2.5.1), which is not conducive to finding a job after graduation. If we learn too many theories, we are not skilled enough. Therefore, many students have to choose to train after graduation.

Lifen: It means that you have learned too little in school, right?

Liang: Yes, there are too few practical lessons (2.5.2), and we feel that our technology is really not good. Students who want to engage in front-end and back-end of Java, they will choose to go to training first.

Lifen: It means that you can do the job only after training. If you don't have training, you can't do the job?

Liang: It can be it just feels difficult. Some companies will recruit more technically skilled people. We take some front-end and back-end courses in school without training, because there are too few practical courses, and it will be difficult to

find a job. So the teacher can let us do more cases during class.

Lifen: Do you have anything else to say?

Liang: Yes. It is best to arrange a large practice project (2.5.3) that can be completed in cooperation with several people.

Lifen: OK, thank you.

Respondent 3: Pan Yuqin, Female, 22Y

Lifen: The fifth question is: What do you think are the shortcomings of your university curriculum?

Pan: Let me first talk about the shortcomings of professional courses. The start of the professional class is too late (3.5.1), it is best to advance a little. Secondly, it is too late for professional courses, it is best to advance a little. When we entered freshman, the first semester was almost full of public classes, and we did n't start learning C programming until the second semester of freshman. I think this course is an introduction to computer language. I think C programming should be taken in the first semester (3.5.2).

Lifen: Do you want to take this course in the first semester of freshman?

Pan: Yes, the introductory class is learned early, and the other classes can be early. When we are studying in school, we have Investigating Student Perceptions on the Impact of the Course Curriculum of a Computer Science Program on Bachelor Students' Future Employability: A Case Study at Baise University I didn't know the development process until I went to off-campus training. If you don't practice to work, you don't feel like this, nor will you. Some courses are boring, and they feel so tired and incomprehensible.

Lifen: What boring courses are you talking about?

Pan: I think Digital Logic Circuits are boring (3.5.4). I don't understand and don't want to learn. We have many theoretical courses, but not much theoretical knowledge is used for real work. The lessons we learned, for me only HTML5 (3.5.5) and Java (3.5.6) are useful. In addition, I want to talk about the classic Red Revolution class, because Baise is a revolutionary Red City, we must learn this course, cannot choose this course cannot graduate. But Red Revolution (3,5,7) class is not helpful for work.

Lifen: Do you have anything else to say about this problem?

Pan: No, that is all.

Lifen: OK, thank you.

Respondent 4: Wan Jinrun, Male, 21Y

Wan: The fifth question is: What do you think are the shortcomings of your university curriculum?

Lifen: The professional direction should not be assigned before entering the school (4,5,1). You should learn the basics together first, and it may be better to choose a professional direction later. Otherwise, the direction is divided in advance. If we do not want to continue to study in this direction later, we will feel that we cannot learn knowledge.

Lifen: Should the direction of information technology and digital media be chosen according to interest?

Wan: Yes. I want to add that some of the knowledge we learned at school is outdated (4.5.2). The knowledge we have learned is different from what society

needs. If the content learned is not refined enough, everything will be a little bit less proficient.

Lifen: Do you have anything else to say about this problem?

Wan: No.





Question 6: What do you think are the shortcomings of your university curriculum?

Respondent 1: Huang Jieli, Female, 22Y

Lifen: The sixth question is: What kind of improvements would you like to see in the program? Why?

Huang: I hope to see more practical projects (1, 6, 1) in professional courses. We cannot just learn theory or basic knowledge. Schools can increase some class hours and apply the theoretical knowledge they have learned to the project training, which will be very helpful for employment.

Lifen: It is necessary to add more practical lessons, which means that our existing laboratory is not very helpful to you, is it?

Huang: We have some practice, but the project is not complete enough. The time for practical classes is relatively short, and they are all on some theory. The project is very simple, only one. For example, for example, to do a shopping website, it does not involve back-end management. There is no APP development, and no small program development.

Lifen: For example, software engineering courses have theory and practice, but practical courses are not enough, are they?

Huang: We have to draw all kinds of figures for each practical class of software engineering class, there is no actual project. I hope to retain some of the previous excellent compulsory courses (1.6.2), such as: Principles of Computer

Composition, Computing Network, etc.; but some obsolete technologies should be removed (1.6.3), such as Flash courses.

Lifen: The sixth question, do you have anything to say?

Huang: No.

Respondent 2: Liang Guilan, Female, 22Y

Lifen: The sixth question is: What kind of improvements would you like to see in the program? Why?

Liang: For computer science students, professional courses can learn more technical content (2, 6, 1) and then less theoretical (2, 6, 2) content. Then do more cases and become familiar with the code.

Lifen: Some of the courses you mentioned earlier, what do you want to see and do not want to see?

Liang: I hope to see, such as Object-oriented Programming (2.6.3), Data structure (2.6.4), Algorithm Analysis and Design (2.6.5), JavaEE (2.6.6) technology and other courses hope to retain.

Lifen: Don't you already have these courses now?

Liang: Yes, We have.

Lifen: What improvements do you want them to make?

Liang: Improve? Do you mean the way of class or the course setting?

Lifen: It's okay, just say whatever you want.

Liang: For the way of class, I hope to practice more (2.6.7) and do more cases (2.6.8). I hope that in the first half of a class, the teacher will talk about some



theories first, and then we will work on the computer in the second half. Let's do more practice we have too few practice classes in school now.

Lifen: Do you have anything to say about the sixth question?

Liang: No.

Respondent 3: Pan Yuqin, Female, 22Y

Lifen: The sixth question is: What kind of improvements would you like to see in the program? Why?

Pan: First of all, I hope that the content of the course will keep up with the pace of the times. I think this kind of technology is really updated quickly. Especially in the IT industry, the update is particularly fast. Like Vue, the mainstream technology of page frames, the version updates are only one year apart. For our fresh graduates, technology is inherently shortcoming. If the school's knowledge is too old (3, 6, 1), it will be more difficult to find a job. Second, I hope to increase the time for practical classes (3.6.2), and I hope that practical classes will be taught by out-of-school training teachers (3.6.3) because they have more experience with the project. If they take us to develop the project, we will better adapt to the work. Third, we must increase the school year design (3.6.4) so that we can do a complete project. When looking for a job, we can say to others: "This is a project I did in my sophomore or junior year." Then people will think I have experience and think I have learned something. Although we learned a lot at university, we did not accumulate knowledge. I may have learned the technology too, but it was embarrassing to not actually use it. If someone asks me, how do you embody this knowledge? I can't answer can I use my score to reflect it? It is not limited to Java and other back-end technologies, but should

expand the scope to allow students to adapt to the separate development of front-end and back-end, as well as the design of pages. I think four years of college are almost learning things, some courses are repeated (3.6.5), such as database, MySQL, Oracle, SQL Server are all database technologies. So that we have learned a lot of databases, in fact, if the database is not combined with the front end, it is useless. I would like to say one more thing. We didn't even have the Video Editing (3.6.6) class. I used to work in the Student Union. At the New Year's party, I needed to do a short video promotion and found that no one would do it.

Lifen: Have you really not taken a video editing class? I remember this lesson was taken by teacher Huang Zhongkui.

Pan: No, he has not taught us.

Lifen: Well, what else do you say about this question?

Pan: No.

Respondent 4: Wan Jinrun, Male, 21Y

Lifen: The sixth question is: What kind of improvements would you like to see in the program? Why?

Wan: I hope that the knowledge I have learned meets the needs of society (4, 6, 1). It is consistent with the company's needs, so that we do not have to go to training before work.

Lifen: Consistent with the company's needs? Can you be more specific?

Wan: For example, the VueJS (4.6.2) framework, ReactJS (4.6.3), AngularJS (4.6.4), Foundation framework, etc. designed by the front end should be learned in school.

Lifen: Do you have anything to say?

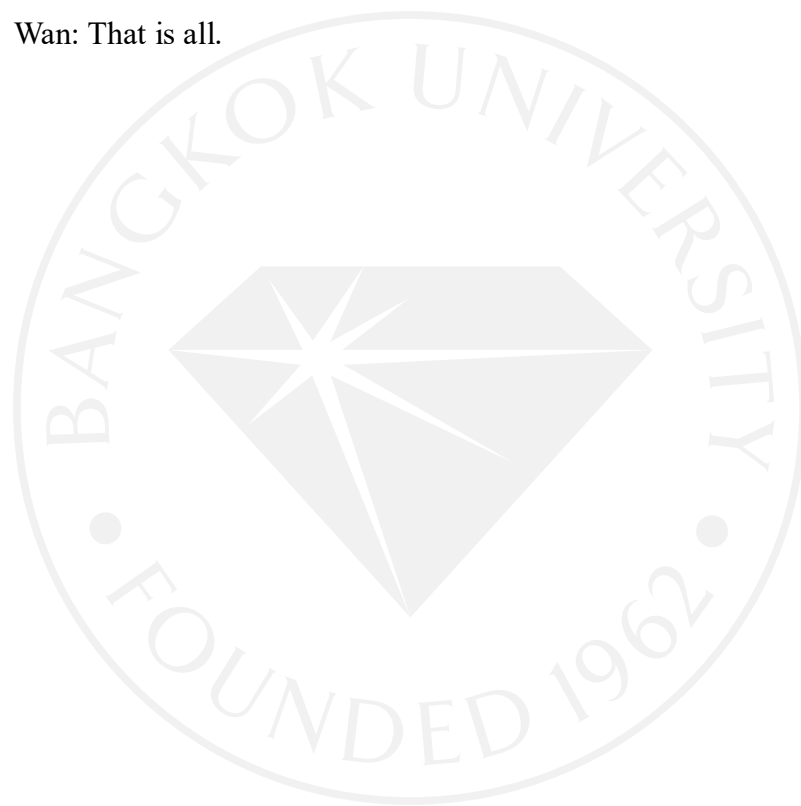
Wan: 3D technology (4.6.5) is now more popular. But we have no chance to learn this technique in school.

Lifen: Didn't Wei Jiaru teach you this class?

Wan: No, we really haven't learned.

Lifen: What else do you want to say about this question?

Wan: That is all.





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Question 7: What NEW courses would you like to see in the program? Why?

Respondent 1: Huang Jieli, Female, 22Y

Lifen: The seventh question is: What NEW courses would you like to see in the program? Why?

Huang: I hope to see some Artificial Intelligence (1.7.1), Big Data (1.7.2), Cloud Computing (1.7.3) etc., so that we can face more job choices when we are employed. When we were freshman, we only learned C language. I hope Java (1.7.4) or Python (1.7.5) can be learned in freshman year. Then in his sophomore year, when some students liked programming, he continued to use Java, and some students liked artificial intelligence, so he could use python instead of everyone using the same thing. Everyone only learns Java, so when they are employed later, they can only choose Java, not other things.

Lifen: In addition to front-end work, what other options do you have?

Huang: According to our current curriculum, if we are engaged in work related to this major in the future, then in addition to front-end design, we can only choose to do Java development.

Lifen: Are there other options? For example, state enterprises and institutions.

Huang: This is okay, I just said that this is the only way to work in this major. Among our classmates, if they are engaged in work related to this major, they choose Java.

Lifen: Do you have anything else to say about this problem?

Huang: No.

Lifen: Thank you very much, you are about to graduate, and good luck.

Huang: Thank you.

Respondent 2: Liang Guilan, Female, 22Y

Lifen: The seventh question is: What NEW courses would you like to see in the program? Why?

Liang: I hope to see Photoshop(2,7,1), Artificial Intelligence(2,7,2), Python(2,7,3) and other courses. Because some classmates are engaged in front-end work, they need to cut the picture and measure the size. If they don't understand Photoshop, it will be difficult. They need to find designers to communicate, which will be very troublesome. So I think Photoshop courses should be added.

Lifen: What about artificial intelligence?

Liang: I think artificial intelligence will become more and more popular in the future, we should increase the class of artificial intelligence.

Lifen: Do you have no Python courses?

Liang: No, no AI, no PS. But I think these are very important.

Lifen: Do you have anything else to say about this question?

Liang: No.

Respondent 3: Pan Yuqin, Female, 22Y

Lifen: The seventh question is: What NEW courses would you like to see in the program? Why?

Pan: First, I hope to see Photoshop (3, 7, 1) course. I remember when I was in freshman year, we thought I was a computer major, and I wondered if I would be a PS in the future, because girls love beauty. Secondly, when doing project development at work, no matter the front-end and back-end development, you need to have a little picture processing ability, which is more important to us. Second, I hope to see JavaScript (3, 7, 2) course. This is called JS for short. This is very important in front-end design. Various dynamic effects can be produced, and the special effects are also great. Thirdly, I personally like to do front-end work. I hope to see current mainstream front-end framework technologies, such as Angular (3.7.3), React (3.7.4), Vue (3.7.5), etc. In the four years of college, the courses I learned at the school and related to the front end are HTML and .net, but the .net technology is outdated and it is useless without us. so awkward. Fourth, I hope to see Artificial Intelligence (3.7.6) classes. Because current picture recognition and voice recognition technology are widely used in many industries, this is a futuristic technology.

Lifen: Is there anything else?

Pan: I personally think that one of the more promising technologies is blockchain technology. I hope to see courses in Blockchain (3.7.7) technology. Following Ma Yun's speech on the blockchain, the state has also encouraged and supported blockchain technology. Not long ago, Guangdong also led the government to use blockchain technology as a loan-related app. This is a trend in the future IT industry.

Lifen: Do you have any courses related to artificial intelligence in university?

Pan: No, but we learned data structures and algorithms. Some algorithms may have a little relationship with artificial intelligence

Lifen: The seventh question, do you have anything else to say?

Pan: No.

Respondent 4: Wan Jinrun, Male, 21Y

Lifen: The seventh question is: What NEW courses would you like to see in the program? Why?

Wan: I hope to see the front-end framework courses (4.7.1), because this will be very convenient for future daily work.

Lifen: Are your classmates working in front-end designs now?

Wan: My classmates may do more digital media work, and some have back-end management. I also hope to see 3D animation technology (4.7.2) courses.

Lifen: Do you have anything else to say about this question?

Wan: No.

## Appendix C

### Narrative Coding and Theme from Raw Data Interview



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Question 1: Based on your personal work and career development plans, what kind of course knowledge do you need? Why?

Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
WeChat applets (1.1.1), Vue (1.1.2) framework, React-native (1.1.3) framework, advanced	I need Photoshop (2.1.1), AI (2.1.2), Database (2.1.3), Web Page Creation (2.1.4), C4D	The courses I need are: HTML5 (3.1.1), Photoshop (3.1.2) (for cutting pictures and drawing pictures	Such as 3D animation technology (4.1.1).	front-end knowledge courses: Vue React-native JavaScript Web Page Creation HTML5	Need Courses: WeChat applets Vue React-native JavaScript computer network NodeJS



Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
JavaScript (1.1.4) programming, computer network (1.1.5) knowledge, and NodeJS (1.1.6). (1.1.7) The course requires front-end knowledge and back-end knowledge.	(2.1.5) knowledge, because my future career is designer. I think these are very important knowledge. I think HTML5 (2.1.6) and CSS3 (2.1.7) are also very helpful to us.	when making web pages), JavaScript (3.1.3) (for dynamic interface operations), Node.js (3.1.4) (front-end server language), Github (3.1.5) and Gitee (3.1.6) and SVN (3.1.7) project		CSS3 NodeJS Github Gitee back-end knowledge courses: Database Other courses: SVN WeChat applets Photoshop Angular computer network AI	Photoshop AI Database Web Page Creation C4D HTML5 CSS3 Photoshop Github Gitee SVN Angular

Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
		<p>managers.</p> <p>I also need knowledge of mainstream frameworks at the front end:</p> <p>Angular (3.1.8), React (3.1.9), Vue (3.1.10).</p>			



Question 2: What inspiration or gains did you get from the courses learned at the university?

Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
(1.2.1) Theoretical courses are important, and many underlying principles require a lot of theoretical knowledge. If you want to make higher	I learned a lot of theoretical knowledge (2.2.1) in college, and I know more about the theoretical knowledge of many courses, but less	The third is that I think the school year design (3.2.1) and practice (3.2.2) are also very important. Although professional knowledge (3.2.3) is important,	The enlightenm ent is to understand the developme nt and direction of the computer industry, but also gained knowledge	Theoretical courses is important. Physical education is also important. School year design, practical course and online courses are also very	Gains: 1. Set up theory classes and physical education classes. Let students combine work with rest. 2. Set up practical classes and

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
progress, you need to practice (1.2.2) in addition to theoretical courses.	practice (2.2.2).	physical education (3.2.4) is also very important. I think online courses (3.2.5) are also very important. I took some etiquette management courses (3.2.5) and taught them to my younger students.	of many theoretical courses (4.2.1).	important too. Students learn a lot of theoretical knowledge at school, but less practice. Etiquette management course is helpful to improve students' self-confidence.	School year design classes to improve students' operation ability. 3. Lectures on etiquette management as an optional course for students to choose.

Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
		I think this course is also very important, it is very helpful to improve people's self-confidence			



Question 3: What course do you find most interesting and most helpful to you? Why?

How to use it in your work?

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
The most interesting should be the practice of WeChat applet (1.3.1). The most helpful course for my job is Java programming (1.3.2).	The web production course (2.3.1) is very helpful. Photoshop (2.3.2) We haven't studied at school, but I have studied it by myself	The practical training courses (3,3,1) at the end of each semester are the most helpful. This technology is also very	The new media courses (4.3.1) are very helpful. Yes, this class is also a kind of practice class (4.3.2), it is very useful.	WeChat applet Java programming Python C language programming PHP Nodejs The web production course Photoshop HTML5 Dreamweaver	Helpful courses: WeChat applet Java programming Python C language PHP Nodejs Photoshop HTML5 Practical Training

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
If you are engaged in front-end work, you must also be familiar with a back-end programming language, which can be Java, Python (1.3.3), C language programming (1.3.4), PHP (1.3.5), or Nodejs (1.3.6).	before, and I think it is useful. HTML5 (2.3.3) is currently used in web page production. Dreamweaver (2.3.4) technology is no longer used.	advanced and belongs to the content of artificial intelligence (3.3.2). The teacher of the enterprise will take us to do the project (3.3.3). I think the Software Engineering (3.3.4) class is helpful,		practical training courses artificial intelligence to do the project Software Engineering should have more practical training courses new media courses practice class	Artificial Intelligence The project Software Engineering New media courses

Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
		<p>there are many figures in it.</p> <p>Our school should have more practical training courses</p> <p>(3.3.5)</p>			



Question 4: What courses do you think is the least interesting and does not help you?

Why?

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
I think Flash Animation (1.4.1) is the most useless. The public class (1.4.2) didn't feel helpful. For example, Military	Digital Logic Circuit (2.4.1) is one of them. I don't think it helps me much in my work. Career Guidance courses	I think the Digital Logic Circuit (3,4,1) course is the most unhelpful. I think Marxist Philosophy (3,4,2) has not helped	It's not that the video production course is useless, it's that the knowledge taught by the teacher in this course is outdated and useless	Flash Animation The public class Military Management Mental Health Education Digital Logic Circuit Career	Useless courses: 1.Flash Animation 2.Military Management 3.Mental Health Education 4.Digital Logic Circuit 5.Marxist

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Management (1.4.3) and Mental Health Education (1.4.4) are useless.	(2.4.2) are helpful. The teacher talked a lot and it was very helpful for finding a job in the future.	me much.	(4.4.1).  There is also .net course (4.4.2) that is useless. Technologies like Vue (4.4.3) are more popular.	Guidance courses Marxist Philosophy knowledge taught by the teacher in this course is outdated and useless .net Vue	Philosophy 6. .net

Question 5: What do you think are the shortcomings of your university curriculum?

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
The first is that there are too few practical lessons (1.5.1) and too many theoretical lessons (1.5.2). Moreover, some courses are relatively	The biggest disadvantage is that there are too many theoretical courses (2.5.1), which is not conducive to finding a job after graduation.	The professional course technology cannot keep up with the current trend and is outdated (2.5.1). The start of the professional	The professional direction should not be assigned before entering the school (4,5,1). some of the knowledge we learned at school is outdated	few practical lessons too many theoretical lessons Dreamweaver HTML5 ECMAScript6 JavaScript Python Python	1. Shortcomings: 1) Too many theoretical courses. 2) Few practical lessons. Some professional courses are outdated. 3) The start of the

Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
backward, and they do not talk about new technologies. For example, Dreamweaver (1.5.3) is still used in web page production. It does not involve the new knowledge points of HTML5 (1.5.4) and the syntax of	Yes, there are too few practical lessons (2.5.2). Yes. It is best to arrange a large practice project (2.5.3) that can be completed in cooperation with several people.	1 class is too late (3.5.1), it is best to advance a little. I think C programming should be taken in the first semester (3.5.2). When we are studying in school, we have few practical	(4.5.2).	Unity3D practice project professional course technology cannot keep up with the current trend and is outdated the professional class is too late C programming should be taken in the first	professional class is too late. 2. Unwanted courses: 1) Dreamweaver 2) Digital Logic Circuits 3) Red Revolution 3. The changes hope to see: 1) Should set up practice project. 2) C programming

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
<p>ECMAScript (1.5.5). The web design does not use JavaScript (1.5.6). We should get to know Python, because many high-end jobs are now done with Python (1.5.7). Unity3D (1.5.8) is used to</p>		<p>lessons (3.5.3). I think Digital Logic Circuits are boring (3.5.4). The lessons we learned, for me only HTML5 (3.5.5) and Java (3.5.6) are useful. But Red Revolution (3,5,7) class is not</p>		<p>semester Digital Logic Circuits Red Revolution the professiona l direction should not be assigned before entering the school</p>	<p>should be taken in the first semester. 4. The courses hope to see: HTML5 ECMAScript 6 Python Unity3D Java</p>

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
make games, and now many game companies will use this technology.		helpful for work.			

Question 6: What kind of improvements would you like to see in the program? Why?

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
I hope to see more practical projects (1,6,1) in professional courses. I hope to retain some of the previous excellent compulsory courses	For computer science students, professional courses can learn more technical content (2,6,1) and then less theoretical (2,6,2)	If the school's knowledge is too old (3,6,1), it will be more difficult to find a job. I hope to increase the time for practical classes	I hope that the knowledge I have learned meets the needs of society (4,6,1). For example, the VueJS (4.6.2) framework,	I hope to see more practical projects (1,6,1) I hope to retain some of the previous excellent compulsory courses	The improvements hope to see: 1. More practice. 2. Retain some of the previous excellent compulsory courses. 3. Reduce some theory classes.

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
(1.6.2), such as: Principles of Computer Composition, Computing Network, etc.; but some obsolete technologies should be removed (1.6.3), such as Flash courses,.	content. Such as Object-oriented Programming (2.6.3), Data structure (2.6.4), Algorithm Analysis and Design (2.6.5), JavaEE (2.6.6) technology and other courses hope to retain.	(3.6.2), and I hope that practical classes will be taught by out-of-school training teachers (3.6.3) because they have more experience with the project. we must increase the school	ReactJS (4.6.3), AngularJS (4.6.4), Foundation framework, etc. designed by the front end should be learned in school. 3D technology (4.6.5) is now more popular. But we have no	Composition, Computing Network some obsolete technologies should be removed more technical content less theoretical Object-oriented Programming Data structure Algorithm Analysis	4. Remove repeated courses. 5. Teachers with practical experience come to class. 6. Set up some new technology courses. The courses hope to see: 1.Object-oriented Programming 2.Data structure



Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
	For the way of class, I hope to practice more (2.6.7) and do more cases (2.6.8).	year design (3.6.4) so that we can do a complete project. Some courses are repeated (3.6.5), such as database, MySQL, Oracle, SQL Server are all database technologies I would like to say	chance to learn this technique in school.	and Design JavaEE practice more the time for practical classes training teachers increase the school year design Some courses are repeated MySQL Oracle SQL Server Video	3. Algorithm Analysis and Design 4. JavaEE 5. Video Editing 6. ReactJS 7. AngularJS

Respondent 1 Interview dialogues	Respondent 2 Interview dialogues	Respondent 3 Interview dialogues	Respondent 4 Interview dialogues	Narrative Coding	Categorizing/ Theme
		one more thing. We didn't even have the Video Editing (3.6.6) class.		Editing meets the needs of society VueJS framework, ReactJS AngularJS 3D technology	



Question 7: What NEW courses would you like to see in the program? Why?

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
I hope to see some Artificial Intelligence (1.7.1), Big Data (1.7.2), Cloud Computing (1.7.3) etc., so that we can face more job choices	I hope to see Photoshop (2,7,1), Artificial Intelligence (2,7,2), Python(2,7,3) and other courses.	I hope to see Photoshop (3,7,1) course. Second, I hope to see JavaScript (3,7,2) course. I hope to see current mainstream front-end	I hope to see the front-end framework courses (4.7.1), because this will be very convenient for future daily work. I also hope to see 3D	Artificial Intelligence Big Data Cloud Computing Java Python Photoshop Artificial Intelligence JavaScript Angular React Vue	The courses hope to see: Artificial Intelligence Big Data Cloud Computing Photoshop Python JavaScript Angular React Vue Blockchain

Respondent 1	Respondent 2	Respondent 3	Respondent 4	Narrative Coding	Categorizing/ Theme
Interview dialogues	Interview dialogues	Interview dialogues	Interview dialogues		
when we are employed. I hope Java (1.7.4) or Python (1.7.5) can be learned in freshman year.		framework technologies such as Angular (3.7.3), React (3.7.4), Vue (3.7.5), etc. I hope to see Artificial Intelligence (3.7.6) classes. I hope to see courses in Blockchain (3.7.7) technology.	animation technology (4.7.2) courses.	Blockchain the front-end framework courses 3D animation technology	3D animation technology

## Appendix D

### Questionnaire



#### Computer Science Courses Satisfaction Survey (for the students)

Dear students,

In order to understand the setting of undergraduate courses of computer science and technology major in our college and improve the quality of teaching, this questionnaire is specially made. This questionnaire is anonymous. Your answer will be our most valuable resource.

亲爱的同学：

**您好！**为了了解我院计算机科学与技术专业本科课程设置情况，提高教学质量，特制此问卷，希望您**建言献策**。本问卷采取不记名制，您的回答将是我们最宝贵的资源。

## Part 1

Please fill in the following questionnaires on the basis of the facts (Single choice) .

请根据事实填写以下调查表（单选）。

## 1. Gender

- Male  Female

## 2. Years of study

- First Grade for Undergraduates  Second Grade for Undergraduates  
 Third Grade for Undergraduates  Fourth Grade for Undergraduates

## 3. Your current job or future job

- Civil servant  Teacher  
 IT company  Other

## 4. In which semester C programming should begin:

- The first semester of the first grade  
 The second semester of the first grade  
 The first semester of the second grade  
 The second semester of the second grade

## 5. Time to separate professional directions:

- Before entering  University  
 After the first  grade  
 After the second grade  After the third grade

6. The technology you want to use in the database course is:

MySQL             Oracle             SQL Server

Part 2: Please indicate the relative degree of importance of the following options for improving employability, study by selecting the appropriate value on the following scale:

1 = Not important at all 2 = Not important 3 = Rather Not important 4 = Rather Important 5 = important 6 = Very important

Serial number	Questions	Level selection					
		1	2	3	4	5	6
7	Reduce theory hours.						
8	Increase practical hours.						
9	Professional courses are consistent with social needs.						
10	Increase practical courses.						
11	Retain some of the previous excellent professional compulsory courses.						
12	Remove repeated courses.						
13	Teachers with practical experience come to class.						
14	The start of the professional class should not too late.						

Serial number	Questions	Level selection					
		1	2	3	4	5	6
15	Set up some new technology courses.						
16	Set up school year design classes to give students the opportunity to participate in a complete project development.						
Comments:							

Part 3: Please indicate the relative usefulness of the following course options for improving employability, study by selecting the appropriate value on the following scale:

1 = Not important at all 2 = Not important 3 = Rather Not important 4 = Rather

Important 5 = important 6 = Very important

Serial number	Questions	Level selection					
		1	2	3	4	5	6
18	Physical education						
19	Lectures on etiquette management						
20	WeChat applets development						
21	Java programming						
22	Python						
23	NodeJS						



Serial number	Questions	Level selection					
		1	2	3	4	5	6
24	Photoshop						
25	HTML5						
26	Artificial Intelligence						
27	Software Engineering						
28	Flash Animation						
29	Military Management						
30	Mental Health Education						
31	Digital Logic Circuit						
32	Marxist Philosophy						
33	.net programming						
34	ECMAScript6						
35	Unity3D						
36	Object-oriented Programming						
37	Algorithm Analysis and Design						
38	Video Editing						
39	ReactJS						
40	AngularJS						
41	Big Data						
42	Cloud Computing						
43	Blockchain						

Serial number	Questions	Level selection					
		1	2	3	4	5	6
44	Principles of Computer Organization						
45	Operating system						
46	Computer network						
47	Discrete mathematics						
Comments:							

Overall, how would you rate the prospects of student employ ability?

(= chances for an undergraduate student to find a good job after completing their studies in the program) of the current Computer Science course curriculum at Baise University?

1=Very poor 2 = Poor 3 = Rather Poor 4 = Rather high 5 = High 6 = Very high

Comments:

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