

Research on Computer Network Quality Education in Higher Vocational Colleges Based on Constructivism theory

Yuanyuan Liu^{a,*}, Hongxia Wu^b

Preschool Normal Department, Sichuan Science and Technology Vocational College, Huayang street, Tianfu New Area, Chengdu City, Sichuan Province, China

^a825182196@qq.com, ^b406864807@qq.com

*Corresponding author

Keywords: Core Literacy, Higher Vocational Education, Computer Network Technology, Teaching Design

Abstract: In view of the problems existing in the cultivation of computer network quality in higher vocational colleges, such as blind professional education, separation from professional development and life-long needs of personal value, giving priority to imparting knowledge and insufficient interest in learning, according to the theory of Constructivism, adopting the teaching method oriented to the cultivation of core literacy, this paper puts forward some teaching methods, such as the integration of theory and practice, the diversification of teaching methods, the prominence of students as the main body, and the leading role of teachers. Compared with the traditional teaching mode, the teaching design has some advantages in the cultivation of the consciousness of equipment and data security, the ability of digital learning and innovation, and the ability of self-learning, to enhance students' interest and sense of participation in learning.

1. Introduction

In the context of the rapid development of computer networks, training students' ability to use and mobilize psychological and social resources (including skills and attitudes) to meet the complex needs of Chinese manufacturing, and improving students' professional literacy of computer networks will affect the quality of national education and the process of the rejuvenation of the Chinese nation. It is of great practical and theoretical significance to study the cultivation of computer network literacy.

In foreign countries, core literacy is based on the development of human beings, and revolves around the cultivation of students' awareness of autonomy, innovation, social awareness and interpersonal literacy [1]. Core literacy is combined with the curriculum. By revising the specific content of curriculum standards, for example, the New Zealand curriculum outline stipulates the basic principles of the curriculum and designs a unique curriculum system composed of core literacy, learning field, attitude and values, and basic skills [2], curriculum reform is promoted. PISA is very representative in the evaluation research of core literacy. It evaluates the effect of curriculum reform from the perspective of students' participation in social activities and whether they have the ability of lifelong learning to judge whether the core literacy goal has been achieved [3]. By referring to the excellent cases of international core literacy training, Xin Tao et al concluded the core literacy training strategies suitable for our country [4]. Taking the development of "from social person to professional person" as the clue, Fang Jianhua used the Delphi expert consultation method to determine the content system of professional quality evaluation based on the needs of enterprises and students' personal development needs [5].

This paper puts forward the core literacy of the course Computer Network Technology in higher vocational colleges, improve it constantly in teaching practice, and explore the training methods of the core literacy of Computer Network Technology in higher vocational colleges. The training program was designed and put into practice. The data were sorted by combining the survey records and students' performance data, and the changes of students were analyzed and compared to finally

draw the research conclusions.

2. Overview of relevant theories

2.1. Theory of Teaching

2.1.1. Constructivism Learning Theory

The representative figure of "constructivist learning theory" is the Swiss psychologist Piaget. He believes that knowledge does not come from teachers' teaching, but is acquired by learners through the help of others to construct or reconstruct specific meaning in specific social life background [6]. This theory emphasizes "student-centered" and requires teachers to be the guide of students' active learning. In the process of teaching, teachers guide learning activities, help students learn, give play to students' initiative and innovative spirit, and finally enable students to realize the meaningful construction of knowledge. "Student-centered" constructivism learning theory can also effectively promote the improvement of students' learning ability.

2.1.2. Active Learning Theory

Active learning theory is based on three basic elements: the first element is the active learner, which requires students to learn actively and be responsible for their learning behavior, take the initiative to find learning resources in the learning process, and complete the homework or task assigned by the teacher after mastering the knowledge; The second element is the interactive classroom, the cooperation and communication between students and practical display, and the problem solving process between teachers and students is the effective interaction process. The third element is anchored teaching, in which teachers first give students an example or idea and leave them space to think, rather than teaching knowledge in detail [7]. Students apply the knowledge learned in class to practical problem solving through independent thinking and construction, combined with the actual situation.

2.1.3. Social Learning Theory

In 1977, Albert Bandura proposed a learning theory -- social learning theory [1]. It focuses on the relationship between the learning process and social behavior, and believes that new individual behaviors can be learned by observing and imitating others. At the heart of Bandura's theory is the idea that learning happens through observation in a social context. In addition, factors such as environment, thought, personality and behavior interact to influence learning in a self-directed goal-oriented manner. This theory has become one of the most influential learning theories and is often referred to as a bridge between behaviorist and cognitive learning theories.

According to Bandura's research, there are four main sources that influence self-efficacy: success or failure experiences, vicarious experiences, verbal persuasion, and emotional states. Success or failure experiences are the most powerful source of influence on self-efficacy because people relate their actual experience to possible future outcomes. Vicarious experience refers to observing how others perform a real or simulated task, especially a task that the observer considers relatively difficult. Verbal persuasion refers to persuading and encouraging people to believe that they are capable of accomplishing a task, which helps them to put in more effort and persevere when problems or difficulties arise. Emotional state. Emotional states affect self-efficacy. Depending on the situation, stressful situations often trigger emotions that can cause people to doubt their abilities. When individuals are not nervous or stressed, they are more likely to successfully complete an activity or task.

2.2. Theory of Teaching Practice

In the teaching practice part, task-driven teaching is carried out around problem solving or task completion. By stimulating students' thirst for knowledge, students are endowed with sufficient autonomy, so that students can complete learning tasks and achieve teaching objectives through independent learning and communication and cooperation. Flipped classroom uses abundant

information resources to teach a large number of knowledge points instead of teachers. The center of teaching changes from teachers to students, and students become the protagonists of learning. In the teaching practice of Computer Network Technology in higher vocational colleges, the teaching methods of task-driven and flipped classroom can help cultivate the core literacy.

1) Task-driven teaching

The theoretical basis of task-driven teaching is constructivism, and the main characteristics of task-driven teaching are the main task line, student main body and teacher leading. Students' learning activities are based on specific tasks or problems. Under the drive of problems or tasks, students actively use various learning resources, explore independently and interact with each other to acquire knowledge and skills. So as to improve students' desire to learn, so as to promote the cultivation of core literacy.

2) Flipped classroom

The flipped classroom, also known as the "upside down classroom," refers to adjusting the time in and out of the classroom to transfer the decision of learning from the teacher to the student. Theoretical knowledge points in flipped classroom are no longer mainly taught by teachers, but are independently learned by students through teaching videos, network resources and related books before class. Therefore, there is more time for teachers to communicate with students.

3. Analysis of teaching status

3.1. To Impart Knowledge, Students Lack of Interest in Learning

Because "Computer network technology" needs to memorize a lot of theoretical concepts, so many teachers in the whole classroom teaching process is to explain the theoretical knowledge, and students can only passively accept, at the same time, most of the students have a weak foundation of computer network knowledge, difficult to understand the inherent meaning of the taught knowledge, the learning effect is poor. 43% of the students think that the theoretical knowledge of "Computer Network Technology" is the biggest learning difficulty, while 19% of the students think that the course of "Computer Network Technology" is not interested in learning, lack of learning motivation is the biggest factor affecting their learning effect. Lack of motivation is the biggest factor affecting their learning effectiveness. 25.23% of the students are indifferent or not interested in the course Computer Network Technology, and only 8.1% of the students are very interested in the course.

3.2. Pay Attention to Theory Teaching, Ignore Skill Practice

The course "Computer Network Technology" has more theoretical knowledge, so teachers attach great importance to the theoretical knowledge, but pay less attention to the practical operation. Many teachers have a perfunctory attitude to the computer operation course, which leads many students to think that the theoretical "Computer network Technology" course is of little use.

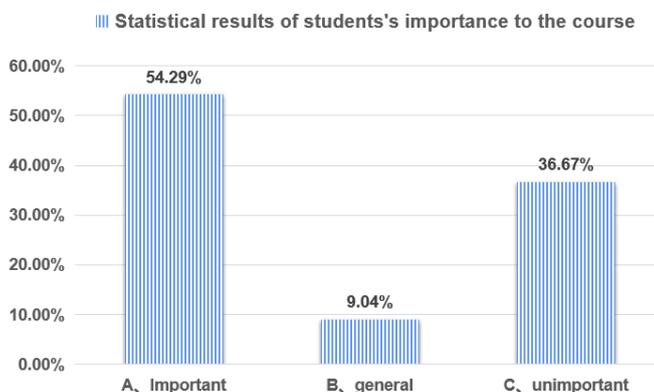


Figure 1 shows the survey results of students' emphasis on the course.

Figure 1 shows the survey results of students' emphasis on the course. As for the question "How

important do you think the course Computer Network Technology is?", only 54.29% of the students choose "very important", and 36.67% of the students think the course is not important. It shows that students do not pay enough attention to the course of Computer Network Technology. Therefore, teachers should spend more energy to design practical teaching, strict management of practical classroom, let students seriously learn practical operation, improve students' attention to "Computer network technology" course, so as to improve the overall teaching effect.

3.3. Students Like Cooperative Learning

More than 60 percent of the students tend to discuss with classmates, consult information on their own or search through the Internet, and only 41.43 percent of the students take the initiative to ask teachers. As for the question "What kind of learning style do you prefer in the computer course of computer network technology", 40.26% of students prefer cooperative learning with classmates, accounting for the highest proportion, indicating that students have a strong sense of independent and cooperative learning in the course of Computer Network Technology, and are less dependent on teachers. Therefore, group learning or independent learning through the Internet may achieve better teaching results.

4. Core literacy oriented teaching design

4.1. Analysis of Teaching Content

This course aims to let students master the basic knowledge and practical skills of computer network, improve their theoretical level and practical ability, and lay a foundation for students to learn other courses, to become high-quality workers in computer network and middle and primary application-oriented specialized talents. Taking X Vocational School as an example, the textbook "Computer Network Technology" is divided into eight chapters. Therefore, students need to master the key is the third chapter computer network technology, the fifth chapter computer network equipment and the sixth chapter Internet foundation. The third chapter computer network technology involves a series of theoretical knowledge such as network protocol, which needs to be memorized and understood proficiently by students. The fifth chapter computer network equipment and the sixth chapter Internet foundation need students to practice and use in the practical training.

4.2. Design of Teaching Objectives

The goal of curriculum core literacy refers to the core literacy that higher vocational students who offer the course Computer Network Technology should have, which is constructed from the definition of core literacy and combined with the characteristics and specific content of the course Computer Network Technology in higher vocational colleges. Initially, it includes equipment and data security awareness, network job responsibilities, ability to cope with changes, quality and cost awareness, and self-learning ability.

In order to make the core literacy of the course Computer Network Technology more rigorous and reliable, this paper designs a questionnaire for the teaching of Computer Network Technology in higher vocational colleges and relevant researchers, aiming at improving the existing core literacy of the course Computer Network Technology. After analyzing the questionnaire, the core literacy of the course Computer Network Technology is obtained. Because the ability to cope with changes can be summarized into the responsibilities and abilities of network posts, it is not regarded as a single core quality, but replaced by professional ethics.

4.3. Teaching Process Design

Based on Taylor Principle and active learning theory, the curriculum content and core literacy training objectives are determined, and the teaching model and teaching method are determined by using constructivism learning theory and active learning theory. Therefore, the teaching of Computer Network Technology in higher vocational colleges is divided into two parts, namely, the study of classroom theoretical knowledge and the practical training of computer training room. The whole teaching process is divided into three links: theoretical learning, practical inquiry and

communication and feedback.

1) Theoretical research

The purpose of theoretical study is to cultivate students' professional ethics, online work responsibility and ability, computational thinking and information society responsibility literacy. Enhance students' professional ethics and sense of responsibility for the information society, and lay a solid foundation for the completion of practical inquiry courses.

2) Practical exploration

The goal of practical exploration is to cultivate students' information consciousness, digital learning and innovation ability, autonomous learning ability, network position responsibility and ability, quality and cost consciousness, equipment and data security awareness and accomplishment. In practice and exploration, students gain a lot of autonomy.

3) Exchange feedback

Communication and feedback are also important. In the process of presentation and communication, the students' information awareness and literacy are improved. Learning feedback, consolidation and preview of knowledge can effectively improve students' self-study ability..

5. Core literacy oriented teaching practice

5.1. Teaching Practice Pre-class Design

In this section, the curriculum teaching practice based on the core literacy training of Computer Network Technology is carried out in X vocational School. Forty students from Class 17 of the second grade majoring in Computer application were selected as teaching practice objects, and four classes of the same grade and major were selected as comparison classes.

The teaching content of this course practice is the hub and switch part in the fifth chapter of the textbook. The hub part mainly includes the function of the hub, the classification of the hub, the selection of the hub and the connection of the hub. The switch part mainly includes the review of the previous three kinds of switching technology, the types and selection of LAN switches and other contents. Therefore, the teaching content is divided into 4 periods, including 2 periods of theoretical learning and 2 periods of practical exploration.

5.2. Implementation in teaching practice class

In strict accordance with the proposed teaching curriculum design, the teaching practice is mainly divided into three steps: theoretical learning, practical exploration and communication and feedback.

1) Theoretical study

The teacher taught the students the theoretical knowledge related to the hub and the switch. During this process, some students wanted to know the size and shape of the hub and the switch, and the teacher played relevant learning videos for the students. Some students also asked about the differences between hubs and switches when they look similar. In the course of theory teaching, students' online job responsibilities and abilities have also been improved. In addition, teachers also intersperse short stories in the teaching of theoretical knowledge to promote students' professional ethics and responsibility for the information society.

2) Practical exploration

The content of this practice is to divide 42 students into 7 groups with 6 members in each group. At the same time, the inter-group homogeneity and intra-group heterogeneity are ensured, that is, the overall level of different groups is consistent and the level of different members in the same group is different. After learning the micro-lesson videos and learning documents prepared by the teacher, I built several simple network topologies by using Packet Tracer software. Then I observed the operation of the hub and switch to understand how the hub and switch forwarded data, and understood the concepts of collision domain and broadcast domain.

3) Exchange feedback

In the feedback stage, the first step was the practical task inspection. The teacher checked the

completion of all students' practical tasks. Among the 42 students divided into 7 groups, 2 groups got A, 3 groups got B, and 2 groups got C. Then there is the practice demonstration. The teacher randomly selects students to show their practice results to the class on the teacher's computer.

5.3. Analysis of After-class Results of Teaching Practice

After a period of teaching practice, in order to conduct a comprehensive analysis of the teaching effect from the dimension of core literacy, the course questionnaire "Computer Network Technology" and the course teaching effect questionnaire are designed. The first questionnaire analyzes the core literacy of information technology major from five aspects: information awareness, computational thinking, digital learning and innovation ability, and information social responsibility. It is aimed at 5 classes of all the computer application majors in Grade two. 226 questionnaires were sent out (42 for the class), and 210 effective questionnaires were recovered (42 for the class). The second questionnaire analyzes the core literacy of Computer Network Technology from four aspects: equipment and data security consciousness, professional ethics, quality and cost consciousness, and self-learning ability. It was only for 42 students in Class 38 of senior high school. 42 questionnaires were sent out and 42 valid questionnaires were collected.

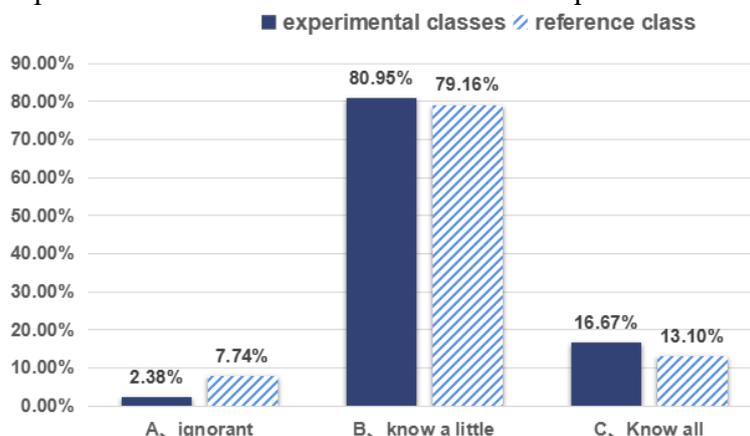


Figure 2 Statistical results of information awareness survey.

Figure 2 shows the statistical results of students' computational thinking survey. For the question "What method would you use to calculate $2+4+6+\dots+100$ " problem. Most students can skillfully use mathematics and computer logic thinking to simplify complex problems, and students in the experimental class perform well.

The survey results of students' digitalization and innovation ability are shown in Figure 3. According to the survey results, the students in the experimental class obviously know more about various learning software and websites than the students in the control class. On the cultivation of core literacy of digital learning and innovation ability, the teaching mode based on core literacy cultivation has obvious advantages..

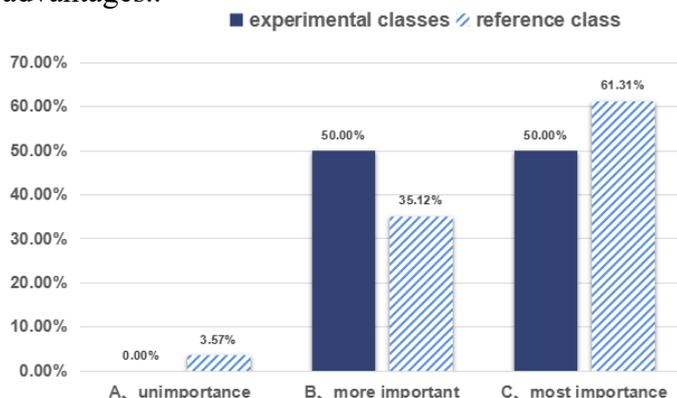


Figure 3 First statistical results of digitization and innovation capabilities survey.

6. Conclusion

Through teaching practice, this paper confirms the advantages of teaching design based on the core literacy training of Computer Network Technology in higher vocational colleges, and draws the following conclusions:

1) The teaching class based on the core literacy training of Computer Network Technology in higher vocational colleges can greatly improve students' sense of participation, train students' autonomous learning ability, cultivate students' cooperative exploration ability, and enhance students' awareness of equipment and data security.

2) This teaching design enables students to have their own ideas and thinking, and truly become the "master" of the classroom. It can also promote students' knowledge and understanding of computer network and cultivate their own computational thinking.

3) This teaching design cultivates students' awareness of information, promotes students' unity, enhances students' awareness of cooperation, and improves students' ability of cooperative exploration.

Therefore, under the background of "Made in China 2025", the country has a strong demand for front-line skills. To vigorously develop vocational education and cultivate all-round professional and technical talents, the teaching mode of core quality cultivation is indispensable. In summary, it can be predicted that there will be more and more core literacy training classes in higher vocational schools.

Acknowledgements

The authors greatly appreciate the following sponsors for their support to the study: Soft Science Project of Science and Technology Department of Sichuan Province, "Intelligent NUMERICAL control system based on physical motion control principle" 22RCYJ0005.

References

- [1] Xin Tao, Jiang Yu, Lin Chongde, Shi Baoguo. On the connotation, characteristics and framework Orientation of Students' Development Core Literacy [J]. China Education Tribune, 2016(06): 3-7+28
- [2] Chen Kai, Ding Xiaoting. Analysis of core literacy in New Zealand curriculum [J]. Global Education Perspectives, 2017, 46(02): 42-57+66
- [3] Xiao Chi, Zhao Yucui, Ke Zheng. Curriculum Policy Based on Core Literacy -- Review of the 13th Shanghai International Curriculum Forum [J]. Global Education Perspectives, 2016, 45(01): 113-120
- [4] Xin Tao, Jiang Yu, Wang Yehui. Construction of Curriculum System Based on Students' Core Literacy [J]. Journal of Beijing Normal University (Social Science Edition), 2014(01): 5-11
- [5] Fang Jianhua. Evaluation of Vocational Core Literacy of Secondary Vocational Students and Construction of its Standard System [D]. Nanjing Normal University, 2014: 147.
- [6] Steve Harlow, Rhoda Cummings, Suzanne M. Aberasturi. Karl Popper and Jean Piaget: A Rationale for Constructivism [J]. The Educational Forum, 2008, 71(1): 103-110
- [7] Yolanda Sarason, Catherine Banbury. Active Learning Facilitated by Using a Game-Show Format or Who Doesn't Want to be a Millionaire? [J]. Journal of Management Education, 2004, 28(4): 74-76 .