Higher Vocational Computer Course Reformation Based on Integration of Industry and Teaching

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Abstract. This paper puts forward the curricular reformation on computer course in higher vocational colleges in accordance with the analysis of the issues existing in the current computer course teaching. In light of the modern concept of vocational curriculum development, the aspects of teaching mode, teaching methods, teachers' abilities and evaluation system should be adjusted to integrate the industry with the vocational teaching process.

Keywords: Integration of industry and vocational teaching · Computer course · Curricular reform · O2O hybrid teaching mode · TPACK

1 Introduction

It is of great significance to deepen the integration of industry and teaching and to promote the cooperation between schools and enterprises as the basic institutional arrangement for the national education reform and the development of human resources according to the report of the 19th CPC National Congress by Xi Jinping, the chairman of China [1]. It is obligatory to improve the quality of teaching in an all-round way under the new educational situation and to promote the supply-side structural reform of human resources [2]. The integration of industry and teaching and the cooperation of schools and enterprises are the most significant parts of the current vocational education policy, which guide and create opportunities for the development of higher vocational education. Under the background of the integration of industry and teaching, keeping up with the pace of the times and promoting the teaching reform of computer courses in higher colleges is an issue worth studying and thinking deeply about.

2 Status of College Computer Course

College computer course is a basic course with the function of general education, which is open to freshmen in colleges. With the popularization of computer, there are some one-sided viewpoints such as "it is enough to know how to use computer",

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"computer is just for designing programs" and "computer course is to explain the use of software" for a long time. The popularity of these viewpoints has caused a great impact on the computer course teaching in colleges. The teaching hours of computer course are compressed in the professional training plan, and the teaching resources of computer course are not adequately allocated. Along with this, the college computer course becomes an optional course. Students are satisfied with the basic operation of computer, the use of daily-used software and the basic programming language.

In the rapid development of information age, the significance of college computer course should not be ignored, but should be strengthened. It is not only the necessary knowledge and skills but also the necessary means for modern college students to adapt themselves to survive in the society. It is an essential link in the cultivation of college students' comprehensive quality and innovative talents. The importance of college computer course is self-evident, but there are still some problems in teaching the course.

2.1 Student Levels

Nowadays, computers have been applied to all industries [3, 4], with the application of the Internet in full swing. Students growing up in such an era are a generation of digital natives who can receive information and vision more quickly than in old times. They prefer graphic thinking, interactive learning communication mode, and a variety of digital tools.

The students in higher vocational colleges are recruited mainly from high schools, single entrance examination and independent enrollment. Among them, the students graduating from high schools belong to the third round of enrollment, while most students with good cultural foundation have entered better universities or colleges through the first or second round. Those who enter through single entrance examination and independent enrollment also have a relatively low cultural level in high schools. Limited by the source of students, the learning levels of students in higher vocational colleges are uneven and their foundation is relatively weak [5, 6]. Take computer skills for example, a small number of students have reached high computer levels or participated in computer competitions in high schools. There is also a minority of students who have never been exposed to computers, which is completely zero basis. The common situation is that students who have already come into contact with computers mainly engage in recreational activities, but their ability to apply computers is poor. In college computer classes, the students with basic knowledge of computer could not concentrate in class for having a certain understanding of the teaching content; the starters can neither respond to the teacher nor keep up with the computer operation. Therefore, the teaching turns out as a failure since the students have no idea what is happening in the class.

2.2 Teaching Mode

Different enterprises also need the talents with varied abilities. The traditional teaching mode during the teaching process of college computer course is still continued till present to train the students in a batch way, in a teacher-centered classroom. Teacher is

regarded as the master of knowledge, on the contrary, student is purely the knowledge receiver. Teacher carries on the infusion-type teaching mode and student passively listens to the class. The teaching pattern which ignores students' initiative of study tends to be cliche, dull and boring. Lacking of interaction between teachers and students, the two parties not sparing enthusiasm in class leads to an unfavorable attendance [7–9].

2.3 Teaching Method and Teaching Content

Many teachers use the traditional teaching method, that is, multimedia courseware, to teach when giving college computer classes. Teaching combined with practical demonstration and operation emphasizes on teacher explaining the key points respectively to students. Because the operation points involved in college computer course are individual, students cannot connect these themselves to the process of learning, it is difficult to attract students' attention to achieve a better learning effect. In addition, most of the time the school formulates the talent training plan without comprehensive investigation of enterprises' demands for talents. Copying the teaching content of other colleges results in the disconnection between teaching and application, and students trained in this way is barely even up to meet the employment standard of enterprises and cannot be qualified for work.

2.4 Teacher's Work Ability

At present, the number of "double-qualified" teachers in higher vocational colleges is small, and most of the full-time teachers are the ones that start teaching directly after graduation. Lacking of working experiences in the enterprise, teachers do not understand the specific post requirements in the enterprise. At the same time, most of the teachers at certain professional level pay more attention to the literal knowledge of this major, not acknowledging TPACK (Technological Pedagogical Content Knowledge) [10, 11], the integrated technology on the subject or still staying in the preliminary phase of learning the mixed teaching mode named O2O.

2.5 Assessment System

The form of final computer examination is generally adopted after the teaching of college computer course. The questions of the test are selected randomly from the item bank. Students are supposed to answer them on the computer. The two parts of the class performance and the final computer test result are combined as the final evaluation results. However, there is no quantified standard for class performance. This kind of examination neglects to cultivate students' ability of calculating thinking of using computer to analyze and solve problems, so it is impossible to adequately evaluate students' comprehensive ability of using computer.

3 Research and Exploration on the Reformation of College Computer Course

3.1 Exploring Interactive Teaching and Cultivating the Sense of Teamwork

In order to solve the problem of uneven computer basis, interactive teaching is explored to cultivate the sense of teamwork. The specific operation of the unit is as follows: first of all, during the military training period of freshmen, a questionnaire survey and a mapping test of computer basic level are organized to better understand the situation of students. Secondly, groups which 4 students are divided into will sit in fixed seats according to the arranged plan in the computer classroom. Students with good and bad foundation will be staggered in the same group, after the mid-term test, the seats are about to be adjusted according to the students levels at the present stage. In this way, it can ensure that students with poor foundation can not only seek advice from teachers, but also ask for help from the students in the group during the daily learning process. This will help to cultivate students' sense of teamwork. At the same time, the introduction of inter-group competition mechanism is to stimulate the learning enthusiasm of students. Finally, in the teaching process, in the practice link students are asked to practice on stage with the explanations from the teacher demonstration. For one thing, it promotes the students' ability of expressing and learning; for another, the teacher is no longer the teacher in a traditional way, and the students pay more attention to the class. The learning results will be improved by teacher summarizing the demonstration link of the students, strengthening the error-prone points and the difficult points in the form of interaction between teachers and students.

3.2 O2O Hybrid Teaching Mode

The integration of industry and teaching should focus on the cultivation of talents and pay attention to the growth of students. In order to break the traditional teacher-centered and classroom-centered teaching mode, we should take the students as the center and the teachers as the leading force by adopting the O2O hybrid teaching mode which combines offline teaching with online teaching [12–14].

The teaching of computer course should make full use of computer network. Teachers should arrange study tasks ahead of time through uploading multimedia courseware, small videos in course website and posting in WeChat account. Students should make use of piecemeal time to prepare for the class in advance. It is feasible to improve students' initiative and efficiency of learning during the process of classroom teaching, group discussion, virtual experiment exercises, induction and summary. After class the teacher arranges the expansion tasks, guides the students to carry on the individualized and independent inquiry study; students can learn by themselves online after class through the micro classes, MOOC [15] and complete the after-school expansion tasks. Taking our college as example, we use the course website, WeChat account, simulative software, and the combination of Lan Moyun classes. Students participate and learn much more positively. In the aspect of curricular reform, we can

combine schools and schools, integrate high quality teachers, and build excellent free online courses to make up for the lack of offline education and teaching resources.

With the help of the O2O hybrid teaching mode, online learning and teaching can provide students with a large number of high-quality learning resources. The interaction between teachers and students has been greatly enhanced, not only in class, but also online to discuss and study problems. The cooperation with teachers can arouse the enthusiasm and initiative in learning, and at the same time, teachers can play a supervisory role, which can effectively ensure the completion of teaching goals, as shown in Fig. 1.

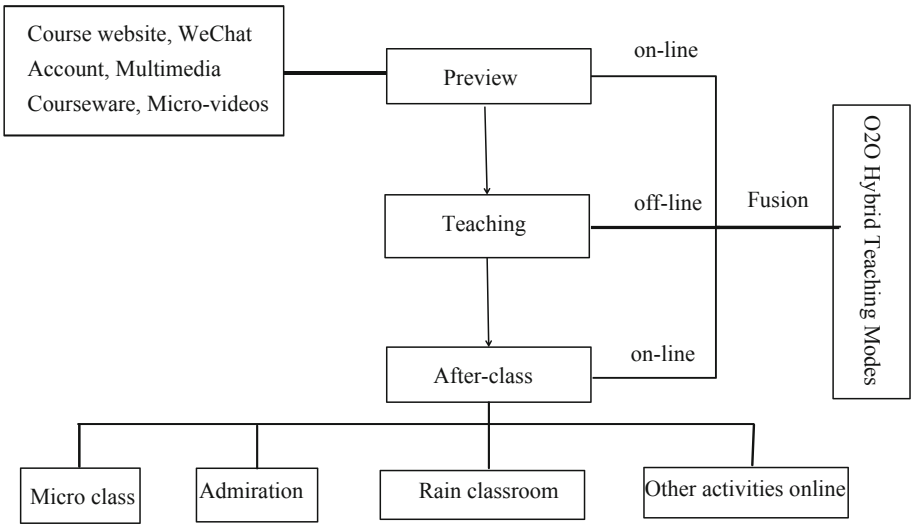

Fig. 1. O2O hybrid teaching modes

3.3 Diversity of Teaching Methods and Refinement of Teaching Contents

In the rapid-developing Internet era, university computer teachers can not only use multimedia courseware to teach, but to try to use a variety of teaching methods, the integration of information-based and traditional teaching methods. At the same time, in the teaching process, we should base on the needs of the enterprises, industrial chain, after investigating the requirements of the enterprises to realize the connection between the curriculum content and the professional standard. The teaching contents should be refined and individualized, so as to provide students with different knowledge, from focusing on course learning to emphasizing the ability, and cultivate talents with high quality and sustainable competitive ability [16].

For example, the production training project of "Voice of Spark" of Sanya Aviation and Tourism College needs to input the data into the spreadsheet quickly. The major of finance needs to use a large number of functions of the spreadsheet, and it emphasizes on Excel when teaching knowledge points. The flight log should be written in the flight crew post, and the maintenance log should be written in the cabin post of aviation

electric mechanical maintenance major, and the software Word is the main focus. When students participate in the innovation and entrepreneurship competition, it involves the standardized production of project plans and the beautification of the effects of demonstrating PPT. The college has set up relevant public limited courses, such as advanced Word operation, advanced PPT operation, etc. It can improve students' practical ability of computer application.

Schools can also introduce intelligent teaching platform. After collecting a large number of data, artificial intelligence will analyze the data for students to develop personalized learning content through online activities to collect students' learning information [17, 18]. On the basis of the teacher's teaching content, it can provide different learning contents as a supplement according to the students' learning progress and the degree of mastering knowledge, which can be used for students' independent learning after class, so that students can either consolidate the foundation from scratch, or learn more knowledge on a better basis, improving the learning efficiency.

At the same time, the method of virtual experiment can be used to refine students' practical ability. In the traditional college computer classroom, students' practical ability is difficult to be fully or effectively cultivated, but under the virtual experiment condition, we can create the real learning situation related to the current learning content. Through virtual experiments we can solve problems, complete tasks and have multidimensional interaction, so that students can learn and use the combination of knowledge and practice. It is also possible to visualize the dull and abstract knowledge and display it directly in a simple and clear way to solve the monotonous problem of teaching form and to improve the students' interest in learning.

3.4 Double-Qualified Teachers and Teachers' TPACK Ability

The construction of teaching staff is the key to the construction of curriculum and the improvement of teaching quality. Teachers play a leading role in the teaching process, and the level of teachers directly determines the quality of teaching. Schools can combine teachers and teacher training to create a dual-qualified faculty team [19, 20]. Full-time teachers and teachers working for local enterprises constitute a mixed team of teachers, in which they can promote with assistance and learn from each other. We send full-time teachers to enterprises to take part in training and studying during the holidays. For example, our college sends teachers to aviation, hotels, logistics and other enterprises in turn for training during the holidays, so as to innovate in practice and solve the practical problems in the production activities of enterprises, as well as understand the orientation of talent trends. Training young teachers through participation in expert lectures, academic conferences at home and abroad, competition training and other activities, college make great efforts on teachers' teaching and scientific research, innovative practice and other comprehensive ability.

In addition, TPACK is a kind of new knowledge that teachers should possess. Only when teachers change their educational concepts, adapt to the rules of information technology development and enhance the ability of information-based teaching, can they better adopt the O2O hybrid teaching model which combines online and offline.

3.5 Application Ability and Pluralistic Evaluation

Examination is an important link in the teaching process to check whether the teaching goal is completed or not. It is necessary to construct the whole process and multiplex computer ability evaluation system [21, 22] with the application ability examination as the core, so as to urge the students to attach importance to self-learning in their spare time to cultivate students' serious attitude, independent thinking, problem-solving and independent innovation ability. The suggested ratios of the process factors are as follows: 10 points of pre-class preparation, 40 points of examination (including 20 points of test and 20 points of final examination), 40 points of virtual experiment and 10 points of homework. In this way, teachers can evaluate the whole learning process of students through their courseware, video viewing, chapter test, final examination, experiment task completion, homework and so on. This reflects students' understanding of knowledge points more truthfully and raises their levels of ability to apply the knowledge to solve problems.

4 Conclusion

In the new era, with the development of vocational education, the supply-side structural reform of human resources cannot be separated from the integration of industry and teaching and the cooperation of schools and enterprises, which also brings opportunities and challenges to the reform of college computer education. Interactive teaching in the college computer teaching cultivates the consciousness of team cooperation, takes the student as the foundation and starts the O2O mixed teaching pattern by merging the information-based teaching method and the traditional one. It is a bold innovation and attempt to connect the teaching content with the professional standard, which builds the double-qualified teaching staff, enhances the teachers' TPACK ability with attention to the application ability. It constructs the whole process and builds a pluralistic evaluation system not only conducive to the development and perfection of university computer curriculum, but also to the cultivation of students' comprehensive and practical abilities, which meets the requirements of modern economic and social development for skilled talents.

References

1. Chen, C.: The problems to be solved urgently in deepening the cooperation between schools and enterprises in the integration of industry and education 2018 speech at the meeting of the expert committee of the Chinese Vocational Education Society abstract. Chin. Vocat. Tech. Educ. **13**, 5–6 (2018)
2. Xi, D.: Industry contribution under the cooperation of industry and education integration in the new era. Chin. Vocat. Tech. Educ. **16**, 32–40 (2018)
3. Sun, G., Lang, F., Xue, Y.: Chinese chunking method based on conditional random fields and semantic classes. J. Harbin Inst. Technol. **43**(7), 135–139 (2011)
4. Sun, G., Lang, F., Yang, M.: Traffic measurement system based on hybrid methods. Electr. Mach. Control **15**(6), 91–96 (2011)

5. Tang, K., Du, G.: Thinking and exploring on the teaching of the course of College computer Foundation under the mode of "Internet". Asia Pac. Educ. **01**, 101–102 (2016)
6. Li, H., Tuo, M., Zhang, H.: A preliminary study of layered teaching of computer basic courses. Comput. Eng. Sci. **38**(s1), 262–264 (2016)
7. Wang, J., Huang, L., Sun, J., et al.: A study on the teaching reform of the course of "College computer Foundation" in the era of "Internet". J. LanZhou Inst. Educ. **34**(04), 107–108 (2018)
8. Xie, P., Zhang, H.: Computational thinking-oriented teaching reform and practice on university computer basic courses. Comput. Eng. Sci. **38**(S1), 245–247 (2016)
9. An, L., Zhao, Y.: Study on college teaching reform based on basic computer courses. Comput. Eng. Sci. **36**(S2), 179–181 (2014)
10. Wang, L.: Internet education: TPACK vocational education under the concept O2O a probe into the reform of teaching mode. Comput. Educ. **08**, 61–66 (2017)
11. Zhang, Z., Zhang, H., Wang, Y.: Research on the factors affecting the development of pre-service teachers' TPACK. Mod. Educ. Technol. **26**(01), 46–52 (2016)
12. Jing, J., He, H., Wang, Z., et al.: O2O application principles of teaching mode in college computer major teaching. Comput. Educ. **02**, 85–89 (2016)
13. Yang, W., Liu, M.: Research on the model and application of multi-mixed teaching oriented by computational thinking. China Educ. Technol. **04**, 129–136 (2017)
14. Lu, X., Tian, M., Li, Q.: Mixed experimental teaching mode for college computer based on micro-class and rain classroom. Exp. Technol. Manage. **35**(06), 203–206 (2018)
15. Wang, X., Wang, F., Peibin: The construction of the intelligent teaching mode based on the rain class. Comput. Educ. **04**, 139–142 (2018)
16. Xu, X., Li, L., Zhan, D., et al.: A new perspective of new engineering: an agile teaching system for sustainable competitiveness. China Univ. Teach. **10**, 44–49 (2018)
17. Zhou, J., Wang, X.: Research on the teaching model of information technology in artificial intelligence era. Comput. Educ. **12**, 109–112 (2017)
18. Yuan, F., Nie, Y.: Research on the bases and teaching support services of ubiquitous learning in the smart era. Mod. Educ. Technol. **29**(05), 26–32 (2019)
19. Han, C.: Research on the construction of computer science and technology in the background of the integration of production and education. Knowl. Econ. **19**, 175–176 (2018)
20. Zhu, L.: Path for cultivating teachers with "Dual-Qualification" and "Double-Competency" in local colleges and universities in the transitional period. Acad. Explor. **12**, 149–152 (2016)
21. Liu, X., Chen, M.: Introduction of computational thinking to the teaching of computer basic courses in higher vocational colleges. Comput. Educ. **5**, 39–43 (2013)
22. Fang, X.: Construction of an evaluation system for computer courses in practical teaching. Comput. Eng. Sci. **38**(S1), 108–111 (2016)