

Research on the Practical Teaching Model of Internet + 3D Printing Technology

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Abstract: In the background of continuous development and updating of “Internet +”, 3D printing technology has gradually become the focus of contemporary development. Traditional teaching methods have a single structure, which is not conducive to the cultivation of students, so people begin to try to combine various new technologies with practical teaching. Because of the unique advantages of 3D printing technology, the introduction of 3D printing technology into practical teaching not only stimulates students' interest in learning, but also promotes the development of teaching and trains more high-knowledge talents with innovation.

3D printing technology is also called rapid prototyping technology. Its main components include digital model files and some powdered metals or plastics. It uses the method of printing layer by layer to construct objects. Compared with the traditional printing technology, this technology has many advantages^[1]. It does not need any mechanical processing, and greatly shortens the printing time. In addition, it relies on the computer to complete various difficult tasks efficiently, which greatly improves the production efficiency, so that the production cost has been significantly reduced, and brings a lot of convenience to life. “Internet +” technology is slowly formed in the boom of science and technology all over the world. It was born under the advanced productivity. It not only provides us with opportunities for innovation and development, but also provides a broad network platform for everyone with innovative consciousness. The emergence of “Internet +” enables the country to bring together innovative talents from all walks of life and provide them with strong economic and technological support so that they can repay the society with more innovative ideas.

1. Analysis of the Application Status of 3D Printing Technology in the Field of Teaching

3D printing technology is an emerging technology developed in the contemporary era. It breaks the skill requirements of traditional processing technology for staff. It can be easily operated and mastered with the help of computers. Through 3D printing technology, various complex parts can be displayed in three dimensions, which removes the constraints of traditional printing technology and solves the shortcomings of traditional machining methods that are difficult to handle complex parts. At present, more and more colleges and universities have begun to pay attention to 3D printing technology, and began to apply this technology to the practical teaching of the school. Today, colleges and universities mainly focus on two aspects of 3D printing technology. On the one hand, they carry out a wide variety of print innovation courses; on the other hand, it is used by universities to enrich the content of traditional engineering practice teaching^[2].

Metalworking internship is a very important part of many colleges and universities. At present, most of the metalworking internships are based on the basic theoretical knowledge of traditional cars, clamps and welding, and simple practical courses. Since most of the students are unfamiliar with the techniques of fitter and electric welding, almost half of the students have not touched these things before, which makes students unfamiliar with these devices and can't understand the fun of learning. In an increasingly competitive market, traditional processing technologies are at risk of being eliminated at any time. If 3D printing technology is to survive in a social environment, it is necessary to introduce new science and technology to innovate and improve traditional technologies^[3]. The emergence of 3D printing technology can solve this problem well.

With the continuous development of society and the emergence of various new technologies, we

need to innovate technology constantly, and at the same time, we need to cultivate more innovative talents. Nowadays, China attaches great importance to the cultivation of the innovative quality of contemporary college students. With innovation, society can develop, and with innovation, the country can be prosperous and strong. Therefore, we have launched various innovation platforms such as Internet +, Maker Space, and Innovation Lab. And we apply 3D printing technology to these platforms to provide the equipment and places needed for students with strong creative interest, and transform their ideas into practical products through 3D printing technology, so that students' innovative thinking can be in line with the actual production and life, and students' innovative ability can benefit mankind.

2. Course Objectives of “Internet +” 3D Printing Technology

The practical teaching of “Internet +” 3D printing technology can try to adopt the blended teaching mode. The so-called blended teaching is to solve the relationship between online teaching and offline teaching, so that it can complement and serve each other. The abundant resources of “Internet +” will enable students to think deeply about the course learning from the online, and bring the problem to the classroom under the line. Teachers have obvious advantages in directing students, highlighting student's dominant position in learning, strengthening the depth of learning, and improving learning autonomy and effectiveness. Its working principle is mainly based on “Internet +” teaching, supplemented by offline teaching of teachers. 3D printing technology is introduced into the teaching process in a convenient and fast way. It effectively changes teaching methods, combines theory teaching with practical teaching, and promotes the development of education^[4].

Teachers can be managers of online teaching platform. Teachers can set tasks through online platform, including publishing curriculum information outline, assigning students' homework after class, examining and approving the 3D model submitted by students to the platform, and evaluating students' learning situation. Teachers can share the latest academic achievements to students at any time. Furthermore, teachers can give in-depth explanations on these contents, and also share the views of other excellent scientists to students. And students can choose the direction they are interested in for reading, and make in-depth study in the information provided by teachers on the Internet. By learning the recent progress, they can improve their understanding of basic knowledge. In this way, students' interest in learning can be stimulated, and the learning method of students is changed from passive learning into active learning.

3. Course Setting of Internet+3D Printing Technology

The entire curriculum of practical teaching of “Internet +” 3D printing can be summarized as the following stages, namely, the learning stage of system knowledge, the training stage of innovative skill, and the improvement stage of teacher Q&A.

3.1 The Learning Phase of System Knowledge.

This stage is mainly based on offline teaching. Teachers can make full use of teaching courseware and teaching videos to teach students. Students can learn the course independently according to the courseware, and search for information on questions they don't understand, and organize them into questions for questioning in class. In class, students ask questions, students discuss and teachers answer questions. Students can also be arranged to explain relevant knowledge points to other students to exercise their expressive ability. After class, students learn and review knowledge points, find information to expand knowledge content, and complete assignments, and teachers check students' mastery of the knowledge by correcting their homework.

3.2 The Training Phase of innovative Skills.

This stage is mainly based on the actual operation of the students. Before the actual operation, the students have a deeper understanding of the course through theoretical knowledge learning and

computer operation demonstration. After the completion of theoretical knowledge learning, they can enter the practical operation steps to be proficient. They can also analyze the causes and solve the problems that may arise in the actual operation. The demonstration of the computer is more intuitive and easy to understand than the teacher's explanation. Through the computer simulation training, the student's dominant position of learning can be fully utilized. The students can not only master the methods of 3D modeling, but also improve their ability to operate the three-dimensional printing technology ^[5].

3.3 The improvement Stage of Teacher Q&A.

Teachers' assisted answering is an indispensable process in teaching. In this process, teachers can lead students to review the theoretical knowledge of previous studies to deepen their memory. It also inspires students to evaluate their classmates and their own practical operation process. By comparing with their classmates, they can find their own advantages and disadvantages, which is more conducive to the improvement of students. Finally, teachers can summarize the problems that students have in the actual operation process, trigger students to think about advanced manufacturing technology and innovative ability, to enhance students' innovative consciousness, and exercise and cultivate their innovative ability.

4. Conclusion

In traditional classroom teaching, teachers seldom meet with students every week, and classroom teaching time is limited. It is difficult to communicate with students about the latest academic achievements. It is also difficult for students to get interested in this course by contacting the academic recent progress. The practical teaching platform of "Internet +" 3D printing technology can greatly improve students' practical skills and their practical operation ability. Besides, it can make up for the shortcomings of traditional teaching methods, and make the dull teaching process rich and interesting, which is of great significance to the reform of school education. 3D printing technology is a representative advanced manufacturing technology in the contemporary era. The integration of the advantages of this technology into the teaching content enriches and expands the teaching content and methods of teachers, promotes the construction of practical courses, changes the boring training courses in the past, and forms a more advanced and scientific new curriculum system. New technology is constantly emerging and developing, so we need to constantly revise and improve the teaching methods and teaching system, train more students with innovative ability, and promote the progress and development of the country and society.

References

- [1] Zhou Mi, Zhou Jian, Pan Xunhai. Research on Reform of Training Course Based on "Internet +" 3D Printing Technology [J]. *Laboratory Science*, 2018(4): 127-129.
- [2] Wu Changzhong, Li Jie, Li Zhongcan, et al. Design of Teaching Platform with Training Innovation Based on "Internet +" 3D Printing [J]. *Science and Technology Innovation Review*, 2017(36).
- [3] Li Renwei, Fu Dapeng, Lu Xiangyang, et al. On "Internet +" 3D Printing and Intelligent Manufacturing Teaching Based on Engineering Training Platform [J]. *Southern Agricultural Machinery*, 2017(14):15.
- [4] Yang Yang, Li Jinliang, Yan Dongni, et al. Exploration and Practice of Training Teaching of 3D Printing in Engineering Training [J]. *China Modern Educational Equipment*, 2016(17):
- [5] Cheng Zheng. Research on Teaching Design of 3D Printing Course in PBL Mode [D]. Shanghai Normal University, 2017.
- [6] Jiang Man, Liu Yingqiu. Application Research of 3D Printing Technology and Tourism Experiment Teaching Direction [J]. *Industrial Control Computer*, 2018(3): 70-71.
- [7] Liang Xiaonan, Yao Jun, Zhao Jinmin. Application Research of Introducing 3D Printing Model

into Sandwich Teaching—Taking Orthopedic Teaching as an Example[J]. *Journal of Minimally Invasive Medicine*, 2017, 12(1): 75-76.