

Research on the Applications of 3D Printing Technology in the Field of General Techniques

Guan Huang

School of Education, China West Normal Univ., Nanchong 637002, China

Keywords: 3D printing technology, Innovative education, General techniques, Teaching innovation

Abstract. 3D printing technology is a rapid prototyping technology, which can construct objects by the means of cutting and printing layer by layer based on the digital model files created by 3D modeling software. Starting from the literature research, this paper introduces the research background, teaching advantages and practical design of 3D printing technology applied in teaching to show the creative application of 3D printing technology in the teaching of general technology.

Introduction

Under the background of "Maker Space", the application of 3D printing in the teaching practice is training students' practical ability and creative thinking ability, which is in line with the core idea of the new curriculum standards. 3D printing technology has become a new teaching aid for students' personality development and independent innovation. General technology class introduction of 3D printing technology, to overcome the traditional teaching mode, to meet the learner's individualized and diversified development, which is an important measure of innovation education to promote the innovative spirit and creative ability is of positive significance. 3D printing application and the value of technology in general education needs to be explored, scientific and reasonable application of 3D printing technology to promote learners in all aspects of progress is worthy of research, training of general technology literacy and optimize the effect of teaching is the main task of this study.

Principles and Relative Applications of 3D Printing Technology

3D printing is a rapid prototyping technology. 3D printing technology is 3D modeling technology based on 3D design model is modeled by discrete layered software and CNC molding system, material stacking bonding layer, final overlay molding, creating a physical product. 3D printer to print a physical object is divided into four stages, which are modeling, layering, printing and post-processing of the four stages.

Value of 3D Printing Technology Applied in Teaching of General Technology

Theoretical Basis and Value Analysis. The application of 3D printing to the general theory of instructional design. First, constructivism learning theory. 3D printing technology used in teaching, based on Constructivism on the basis of creating a team to complete a learning task through cooperation, promote mutual exchanges and cooperation between learners, communication and discussion, realize the meaning construction. Second, the tower of experience. American educator DELL to acquire knowledge and ability of all kinds of experience, according to its level of abstraction, is divided into three major categories of the eleven levels, the bottom of the most direct experience, the more abstract. The introduction of 3D printing technology to teaching practice is helpful to the transition from experience to experience, and to create the conditions for abstract experience. Then, in the school of tomorrow, Dewey puts forward, "it is better to learn from doing than to learn by listening." 3D printing technology to create task scenarios, the cooperative way to solve the problem in the process of practice, promoting people to people exchanges and communication, the formation process and thinking of problem solving, ready to adapt to the social environment. Finally, the nature of general technology determines the way of teaching experiment teaching method. The experimental method is a teaching method which is used by the students under the guidance of the teacher, the use

of certain instruments and equipment to operate independently, observe and study the phenomenon and process caused by the operation. Through this study, the students' observation ability, independent thinking ability and practical ability have been well trained.

Knowledge Applications Value of 3D Printing Technology in Teaching of General Technology. In contrast to most traditional classroom teaching, a single medium is used to learn abstract concepts, such as a flat picture, through the learner's memory. 3D printing can effectively integrate the thinking process, hands-on practice, innovative design, through the media to learn the general technical knowledge will get better results.

Practical Applications Value of 3D Printing Technology in Teaching of General Technology. The application of 3D printing technology in the teaching of general technology course can stimulate the students' innovation consciousness and innovation ability, promote the innovation of the learners, and cultivate the innovative talents. 3D printing technology plays an important role in the general technology curriculum, mainly reflected in the following points.

3D printing technology will be applied to the general technology teaching, the cultivation of learners' innovative thinking and ability, make learners learn flexibility in the use of 3D printing technology, 3D modeling, learners will design and design thinking into contact model. In the process of 3D modeling, the learners can fully understand the design ideas and modify the design blueprint, so as to get the optimal design model. Cultivate the ability to use technology to solve practical problems, consciousness and thinking and innovative thinking, innovative ability and innovative awareness, so as to get the social development of innovative talents.

Three-dimensional design software can make the students according to the experience of the plane design into three-dimensional space model, with the help of 3D printing technology. Traditional design, learners cannot be converted into a physical experience cannot be shared. For example, in the physical design, the equipment and the ability to draw their own limitations and cannot be achieved. But based on 3D printing technology, the learner can directly print out the physical design, sharing and collaborative communication, promote cooperation and cooperative learning among learners, stimulate learners' enthusiasm for innovation.

Constructivism believes that learning activities should occur in the context should be combined with social practice activities. 3D printing technology into the classroom, the creation of problem situations, to promote students' learning passion. To change the traditional teaching mode, such as the students have less opportunity to operate. The problem is mainly caused by the following aspects, one is the capital and the lack of class, resulting in laboratory equipment, practical operation and the number of time; on the other hand, it is the lack of general technology relates to the experimental contents, such as machine tools, is dangerous, causing personal injury to avoid and does not allow the practice. 3D printing technology for the general technology teaching to create a good problem situation, stimulate students' interest in learning and improve learning motivation and security.

Design Case of 3D Printing Technology in General Technology Teaching

Summary. The general technology curriculum standards pointed out: "the student is a common technique for the masters of learning, teachers are the organizer, the introduction of general technology learning and help" thus, we combined with the teaching practice, to determine the anchor of the teaching model based on constructivism.

The basic process: creating a situation - determining the problem - autonomous learning - collaborative Learning - effect evaluation

First, create the situation. The creation of the situation, that is, teachers should learn according to the knowledge of the design of a situation into the scene, as far as possible localization, in line with the level of knowledge of students, combined with the reality of life. The use of three-dimensional software to create three-dimensional animation or the actual model to create a student quickly into the state of the simulation situation, stimulate students interest in learning, guide students to find problems.

Second, determine the problem. In the above situation, the problems raised by the students are messy, teachers should be in a timely manner with the students to sort out, so timely guidance. Select the topic closely related to the current learning topic or the real task as the center of the study, the problem or event is the anchor".

Then, autonomous learning. To solve the problem of not directly by teachers should tell students how to solve problems, but from teachers to students to provide information or related technology, pay special attention to the development of students' autonomous learning ability.

Then, collaborative learning. Discussion and exchanges in the form of group, the group by group members, the discussion between students and teachers, through different points of view and, supplement, amendment, deepen students' understanding of each of the current problems, to achieve meaningful learning.

Finally, the effect evaluation. Through the group self-evaluation, mutual evaluation, teacher evaluation, learn from each other, sum up their own shortcomings, learn the advantages of others,

Design Case. Teaching topic: prototype and model making

Teaching method: The teaching process of the contents of this section is mainly through the teachers' demonstration, students' innovative design, the multifunctional stationery box design into the 3D model, with the help of 3D printing to achieve real visualization, achieve the goal of teaching.

Teaching link: Multifunctional stationery box. Here we look at the use of 3D modeling software. Three-dimensional design software is an essential tool for the application of 3D printing technology in the teaching of general technology. We use three-dimensional design software for teaching activities. The use of three-dimensional design software and version: 3D

Draw step: The first step, open the software, select a simple template to analyze the components of the model, to develop the learner, do anything to start from the analysis.

The second step, the design of 3D sketch. First of all, in the 3D sketch drawing, select the rectangle, determine the three corners of the rectangle to determine the way a surface, respectively, the input of the three coordinates (0,0,0), (340,0,0), (340,210,0), determine the bottom. The rest can be done in the same way. Then, according to the 3D sketch 3D model. The new parts, choice of drawing hexahedron bottom surface, the bottom surface of the input vertex coordinates (0,0,0) and the length and breadth were 340, 210 and 10. the same way, get around the coaming and the partition and the three-dimensional model of the multifunctional stationery box built complete the. Finally, the multifunctional stationery box is beautified so as to obtain a pen container.

The third step, the use of 3D printing technology to print three-dimensional model. First, the design of the three-dimensional model is saved as stl file format. Secondly, the 3D model is introduced into the Cura-abaci software for cutting and slicing. If the model is too large, you can select the model to change the size of the model. Then, the print settings, such as the selection of the nozzle. Finally, the model of the information transmitted to the 3D printer, 3D printer to preheat, to achieve the preset temperature, 3D printer will operate for 3D printing, and finally get 3D print kind. The fourth step, to beautify the physical treatment. Learners can meet the requirements of their own creative design on the surface of the multifunctional learning supplies box. For example, drawing patterns and so on, has been in line with their own personality stationery box. The result is shown in Figure 1.

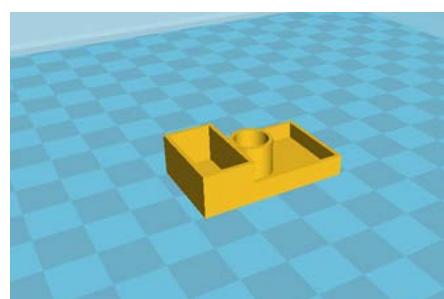


Fig. 1: Three-dimensional model drawn by 3D Printing Technology

Classroom tasks: Teachers: 4 to 6 students in each group, each group of students to complete the design and printing of a multi-functional learning supplies box, collaborative communication,

cooperation, the final results of the display and analysis and evaluation of results. The teacher can provide corresponding learning task requires learners to independently design the plane design drawings and samples to create 3D model according to the description, so as to realize according to the sample preparation requires parts (components) and describe their design ideas and culture space imagination teaching objectives. In the learning task, the model needs to design drawing, design model, 3D printing multifunctional stationery box, in the team the difficulties and the solutions of the key design and achievement, can be a simple explanation in a simple Word document form, at the same time, teachers can according to the actual needs and improve the optimization of teaching design, to meet the different stages and levels of learners. Students: cooperative learning, help each other, form a learning community, complete the learning task and improve the ability of practical operation.

Communication and presentation: Each group in learning based on single task, report to the other students their own design concepts, describe the design drawing, display 3D print results and the modified results, reflection and evaluation in the process of design. The teaching design is the application from the perspective of constructivism teaching mode based on the development of innovation education, to cultivate students' autonomous learning ability, innovation ability, spatial thinking ability and cooperative communication ability. 3D printing teaching form innovation, can stimulate students' interest in learning, compared with the traditional teaching, to a certain extent, optimize the teaching process, improve the teaching effect, can contribute to the innovation education.

Conclusion

The research shows that innovation education is influenced by many factors. It is obvious that the imbalance of educational investment in our country, the problem of curriculum arrangement, the traditional education concept of the application of 3D printing technology in teaching will affect the innovation education. But 3D printing technology is a new trend of teaching development. We combine science and technology with teaching to promote social progress and educational reform and innovation, improve teaching effectiveness, and cultivate the persons the society needs.

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