Application of Virtual Reality Technology in Product Design Teaching

Tong Ren[*]

Zhengzhou University of Light Industry, Zhengzhou 450000, Henan, China. E-mail: 2005010@zzuli.edu.cn

Abstract: Product design is a course with high requirements for practical ability, which means that practical activities are very important for students of this major. However, due to the influence of various practical factors, there are not many opportunities for the students of this major to really practice. For a long time, it will affect students' practical ability, which is not conducive to the cultivation of students' core professional ability. As a new type of computer simulation technology, virtual reality technology can build a virtual environment for students, so that students can get immersive experience. Therefore, the application of this technology in product design teaching can improve students' practical ability. This paper mainly analyzes the application of virtual reality technology in product design teaching.

Keywords: Product Design Teaching; Virtual Reality Technology; Application

With the development of education, in order to meet the needs of social development, product design teaching gradually improves the teaching needs to better achieve the goal of teaching service. This change also puts forward higher requirements for students, that is, students not only need to master product design related knowledge, but also need to enrich their own practical experience. In the traditional teaching mode of product design, the resources for students to practice are scarce, which will lead to the learning effect is not ideal. For a long time, it was not conducive to the career development of students majoring in product design. Through the use of virtual reality technology, teachers can help carry out teaching work, explain the product design mentioned in the book in more detail, and help students improve their practical ability.

1. The current situation of product design teaching and the advantage analysis of virtual reality technology

1.1 Teaching status

1.1.1 Current situation of teachers' teaching

At present, the teaching staff of major colleges and universities needs to be strengthened. Some product design teachers are used to taking exam oriented education as the main idea of teaching and overemphasize the traditional teaching rules. The teaching mode adopted by these teachers is single and backward. Most of them use blackboard and chalk for teaching and overemphasize the accumulation of professional knowledge, which basically takes up two-thirds of the classroom time to explain the relevant knowledge of product design knowledge. Teachers focus on the teaching of theoretical knowledge. In the long run, students lack the necessary communication and flexibility in their study, which easily leads to the phenomenon of high score and low ability, and hinders students from using product design knowledge flexibly. In addition, in the limited time, teachers cannot impart all the knowledge to students, so they cannot fully grasp the knowledge in the classroom, relying on after class learning. But most of the students are lack of learning autonomy and guidance after class, and sometimes, they have

nothing to do, which leads to low learning efficiency.

1.1.2 Current situation of teaching environment

There are many problems in the teaching of product design, such as the shortage of supporting facilities, the lag of teaching software, and the limited equipment available in the training room. This kind of teaching environment obviously cannot meet the requirements of product design teaching. At the same time, this situation greatly limits the development of teachers' teaching and the improvement of students' comprehensive quality.

1.2 Advantage analysis of virtual reality technology in product design teaching

The application of virtual reality technology in product design teaching can transform abstract learning content into concrete learning content, and improve teaching efficiency; in the environment of virtual reality technology creation, students can better absorb the product design knowledge taught, in addition, they can better master the knowledge through simulation operation, so as to improve teaching efficiency the purpose of the fruit.

Using virtual reality technology in product design teaching can also make students enrich their own experience. In the created virtual environment, students can design products with personal characteristics according to the teaching requirements. In this teaching mode, students not only consolidate the theoretical knowledge, but also can use the knowledge to guide their own practical activities.

2. The application of virtual reality technology in the teaching of product design

2.1 Application of Solid Works software in product design teaching

Solid Works software has the characteristics of easy to start. The application of Solid Works software in product design teaching can accomplish the teaching efficiently.

2.1.1 Line body combination

"Line body combination" refers to the combination of curve and solid. Unlike Nurbs modeling software, Solid Works software is different from Nurbs modeling software. The former modeling process is to draw solid directly from sketch curve. Therefore, the combination of curve and entity is the foundation of Solid Works software teaching. The curve in Solid Works software mainly refers to sketch curve and 3D space curve.

Sketch curve can be regarded as the entry-level operation of Solid Works software teaching. The first step of using sketch curve is to draw the curve in sketch module, which requires that the drawn curve must be closed and fully constrained. If the system software detects that the drawn curve does not meet the above requirements, the entity cannot be generated or the parametric design and modification cannot be carried out. Therefore, when teachers apply Solid Works software to product design teaching, they need to remind students to practice more basic skills. Mastering the application of the software is not achieved in one move. Instead, they need students to carry out sketch drawing training from simple to complex, so as to achieve the degree that practice makes perfect.

2.1.2 Combination of line and surface

"Line surface combination" refers to the combination of curve and surface. Solid Works software has powerful surface modeling function. After the previous step, you need to convert the drawn curve into a surface, which contains a plane sketch curve (a curve drawn by multiple anchor points in space). When drawing curves in the software, it is necessary to define the curves based on the points or lines defined by parameters, that is, to achieve the final surface design.

"Line surface combination" is the second step of Solid Works software teaching. The learning in this stage is divided into two levels. The first level is to draw one or more plane sketch curves, and the corresponding surface is generated by the drawn curves through the set parameters. The second level is to use mixed plane sketch curve and space free curve to draw surface to generate more complex surface. The surface drawn in Solid Works software is driven by parameters. When the user adapts the parameters, the surface will change accordingly, and this change will continue to the later module. Therefore, in order to do a good job of "line surface combination", we need to start from the most basic drawing curve.

2.1.3 Combination of music and reality

"Combination of curved and real" refers to the combination of surface and solid, because Solid Works software has strong compatibility and conversion. Therefore, the software can not only combine the solid and the surface easily, but also combine

the model drawn in the solid module with the model drawn in the surface module; meanwhile, it can realize the transformation between the solid and the surface, generate the solid by thickening the surface or stitching different surfaces, and generating the surface by reducing the thickness of the solid.

Taking the drawing of table lamp in the teaching of product design as an example, the lamp is generally divided into three parts: lamp cover, lamp holder and bulb. Firstly, the lamp cover of the lamp is drawn by combining line and surface. The surface of the lamp cover is generated by the combination of the sketch curve of the mixed plane and the free-form curve of space. Then, the surface is transformed into solid body by the thickening function of the software.

The purpose of generating lamp holder is achieved by using multi plane sketch curve to generate surface. The surface is transformed into solid by the function of software stitching.

The light bulb is drawn by "combination of lines and bodies". The light bulb body is obtained by drawing the peripheral outline sketch and the central axis, and rotating along the central axis.

Through the Solid Works software, the lampshade, lampholder and bulb are uniformly assembled, and the complete desk lamp is finally drawn. The software finally realizes the combination of curve and solid, and also highlights the characteristics of the combination of surface and solid.

2.2 Application of AutoCAD software in product design teaching

Taking the plastic mold as an example to teach product design, the purpose of this course is to make students deeply understand the design ideas of plastic mold and master the design methods of plastic mold. In this course, AutoCAD drawing software and traditional manual drawing can be used in mold design at the same time, which can better improve students' practical ability.

Firstly, the structure of plastic mould is designed by using AutoCAD software. Through the combination of AutoCAD drawing and hand drawing, students' comprehensive drawing ability can be improved. If students encounter problems in the design process, they need to actively consult materials to solve problems, and select standard mold base. This learning process can help students to deepen their understanding of the structure of plastic mold and strengthen the use of design methods.

The application of AutoCAD software in product design teaching can help students master the design method of plastic mold, make the assembly drawing and part drawing more standardized, and make students familiar with the application of some office software. In a word, the software can not only help teachers to design reasonable teaching content, but also help students to clarify the design ideas, make the distribution of teaching content reasonable and the difficulty step by step, so as to make the students' learning ideas clear and finally make the teaching effect better.

3. Conclusion

To sum up, in order to improve the teaching of product design in colleges and universities, we need to use virtual reality technology in the teaching process to provide interactive and experiential classroom for students. This teaching mode is conducive to cultivate the innovation ability and practical operation application ability of students majoring in product design. The teaching goal of comprehensively improving the practical ability of students majoring in product design can be finally realized, and more high skilled talents with employment ability will be cultivated for the society.

References

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