

Research on the application of VR technology in teaching -- a case study of "quiet night thinking" teaching

Ruifeng Dong

Wenzhou Vocational & Technical College, Wenzhou. 325035, China.

Dong23@126.com

Abstract

teaching activities need to rely on certain technical means, therefore, with the change of teaching technology, teaching mode, teaching activities and other aspects will have a change. The teaching technology is becoming more and more advanced, which makes the current education teaching misconduct progress, and human education thinking and consciousness also progress. Therefore, with the emergence and popularization of virtual reality technology, virtual education breaks through the traditional education teaching mode and brings a unique and unprecedented education mode to education field. This education model will have a great impact on the development of education and the innovation of teaching ideas in the future.

Keywords

VR; Teaching; application.

1. Background

VR technology (Virtual Reality, virtual Reality technology) is a highly simulated human-computer interface technology that simulates human's visual, auditory and dynamic behaviors in the natural environment. VR technology enables people to enter a virtual environment by means of multimedia sensing and interactive devices, and generate an immersive feeling. This kind of virtual environment is generated by computer. It can be a simulation of the real world or an imaginary world.

Overseas research status:

The education field in the United States attaches great importance to VR technology. It has set up a special virtual technology and education laboratory, and organized a mobile teaching plan to evaluate and upgrade relevant software and hardware while observing the effect of education.

In the research on virtual reality technology in Europe, the UK is in the leading position. They set up a VR education project in middle schools to constantly explore how to use VR for education in English, industrial safety and other aspects. The university of Nottingham also runs a project to study VR input devices on desktops.

Domestic research status:

In recent years, colleges and universities in China have conducted relevant researches on the application of VR technology in many fields. In general, domestic researches on the application of VR technology in education mainly include the following aspects:

(1) Virtual simulation campus

Based on VRML international standard and SGI hardware platform, tianjin university has developed a virtual campus, which is also the earliest university in China to develop a virtual campus.

Zhejiang university showed off its virtual campus at the national 863 achievement exhibition. This is very important to promote the combination of virtual reality technology and education.

The remote education college of the central radio and television university adopts the game graphics engine based on the Internet, and combines the actual function of the network college with the graphics engine, thus breaking through the function of virtual reality technology on campus browsing and realizing the large-scale application of technology on the basic platform.

(2) Virtual teaching

Due to the interactive characteristics of virtual reality technology, it is widely used in education teaching activities of science and engineering, especially in physics, chemistry, architecture, machinery and other subjects. The application of virtual reality technology can promote the better development of these subjects' teaching activities.

Tongji university has a VR laboratory that can simulate the architectural landscape. Southwest jiaotong university has realized the use of VR technology in engineering roaming. The university of science and technology of China widely USES VR technology in physics experiments. , etc.

2. Analysis

As a new technology, VR technology is the top of the current research, and how to put the VR technology into teaching, also is one of focus in the study of the current colleges and universities, the higher vocational colleges, we pay more attention to students' practical ability, so the integration of VR technology will bring a teaching way to change, not only make students more into, and still can reduce the cost of training. In previous researches, more theoretical researches or researches are focused on the realization of platform, hardware and new functions, while the application and research and development of practical teaching software are few.

3. Design content

The basic idea of the research: take the literature teaching of "quiet night thinking" as an example, explore the practical process of integrating VR technology into teaching, and finally complete the research and development of relevant VR teaching software.

The main contents of the research are: practical usage specifications of VR technology, usage methods of VR development engine, VR teaching scene and interaction design, collection, design and production of relevant resources (model, animation, scene), development and implementation of scene interaction.

Basic steps of research:

- (1) Start from understanding VR technology
- (2) Understand VR development engine
- (3) Take literature teaching of "quiet night thinking" as an example to study the manifestation of virtual reality teaching
- (4) Design and make relevant resource components;
- (5) Use the development engine to complete interaction design and resource splicing to form VR teaching software.

Preliminary equipment work:

- (1) I have completed the study of VR technology
- (2) Basically mastered the use and development of VR development engine
- (3) Some model, animation and scene resources required by the teaching software have been collected and produced
- (4) The development environment has been built
- (5) Develop related devices (HTC VR devices; GearVR; Samsung S6

4. Modeling basis

How to create points, lines, faces and entities in 3D, as well as how to modify the knowledge of points, lines, faces, entities and so on, is the basic knowledge of modeling with 3D.

4.1 Establishment and editing of points and lines

Point, line, curve tool

4.2 Surface establishment and editing

Set up surface, surface tool

4.3 Entity establishment and editing

Create entities, entity tools

4.4 Point to establish the curve from the object

4.5 Establishment and editing of points and lines

Generally, curves are created and edited by points, while curves are the basis of constructing surfaces. The quality of curves directly affects the quality of the generated surfaces, so it is very important to master how to create high-quality curves.

point

Points are the simplest data types available in Rhino 3D, represented by a small dot, as shown in figure 1.

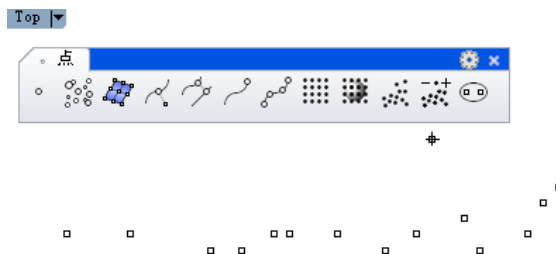



Figure 1 a.m.

4.5.1 Point


Points are used as auxiliary objects in 3D software to achieve a function of capture and cannot be rendered, exist as a basic element and cannot be decomposed. If you find the icon button in the toolbox, long press the icon or click the black triangle, the extension toolbar will pop up and drag the blue and gray bar at the top of the extension toolbar. The extension toolbar opened is shown in the extension toolbar shown in figure 2.




The extension toolbar in figure 2

 activate icon tool, after waiting for the command line prompt, can be arbitrarily in the view area to create a single point object.

To define the exact position of the point, the command bar is required to complete. For example, enter a point with X axis 4 and Y axis 3. If you enter a point with X axis 4, Y axis 3 and Z axis 5, you need to enter: in the command bar to create it.

 activate icon tool, can continuous click in the drawing area, which can generate multiple objects.

 click to mark curve starting point, right click to mark curve end point. Activate the icon tool to place a point object as a marker at the beginning or end of a curve.


 Right click to segment the curve according to the number of segments. Right-click the icon tool and segment a line by length (the line length is 40, enter 8 in the command bar, and the result is divided into 5 parts, as shown in figure 3.



FIG. 3 segmented curve according to segment length



Left-click icon tool to take an ellipse as an example: input the value of 12 on the command line, press Enter or right click to divide the ellipse into 12 line segments, as shown in figure 4.

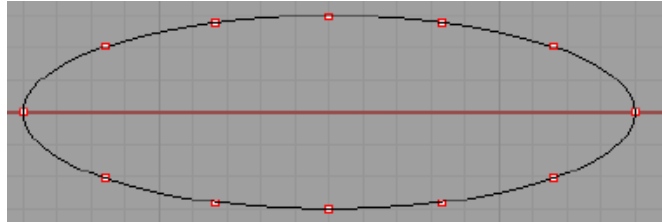


FIG. 4 segmented curves according to the number of line segments

4.5.2 Line

In Rhino5. Where, line, original, arc, ellipse, two-dimensional multi-segment line, three-dimensional multi-segment line, additional line and spline curve are collectively referred to as curve. Among them, there are two kinds of spline curves. One is the control point spline. The control point spline only passes through the first and last points on the spline curve. The other type of spline is the interpolation point curve, where the interpolation point spline passes through all the known points in the curve.

The Degree of the curve is the highest Degree plus 1 in the mathematical expression of the curve. For example, a line is a second-order curve, a conic is a third-order curve, and a third-order curve is a fourth-order curve. The higher the order, the higher the curve precision is.

A curve also has a direction, and the direction of a curve is represented by its starting and ending points.

Keyboard input parameters or the coordinates of key points to create a curve, you can also click to determine the location of key points to draw a curve, curve extension toolbar

4.6 Mesh options

Grid Settings are important in the final rendering and production of RP model conversion STL files. In cases where rendering requirements are not high, the grid Settings can be left as default. However, if you want to get high quality rendering effect, you must set "Antialiasing" option and network option simultaneously.

In the Mesh option setting, friendship rendering Mesh quality project has three modes to choose from. The rendering speed is crazy, but the number of Mesh segmentation is small and the rendering quality is poor. In "mode, the rendering is relatively pinghu, with high quality but slow speed, large amount of data and long time consumption, as shown in fig.5 and 6.

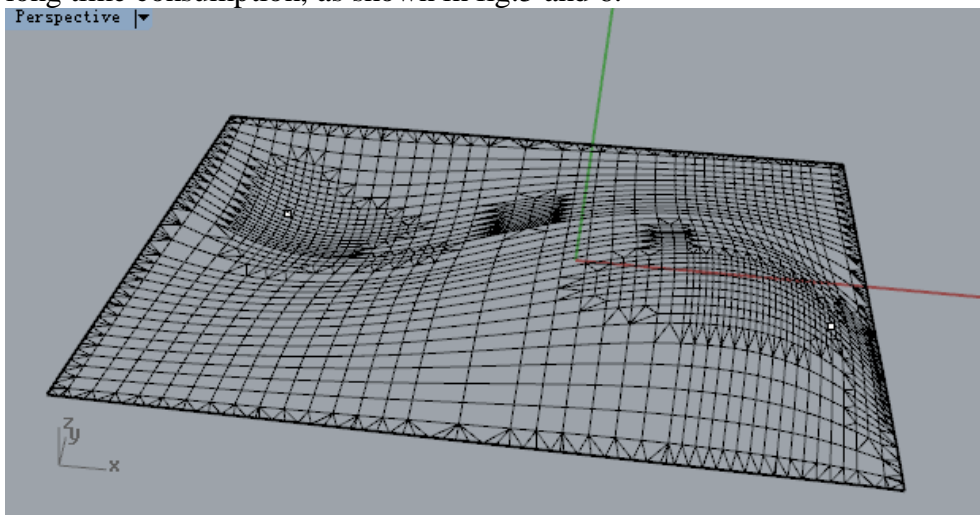


Figure 5 is rough and fast

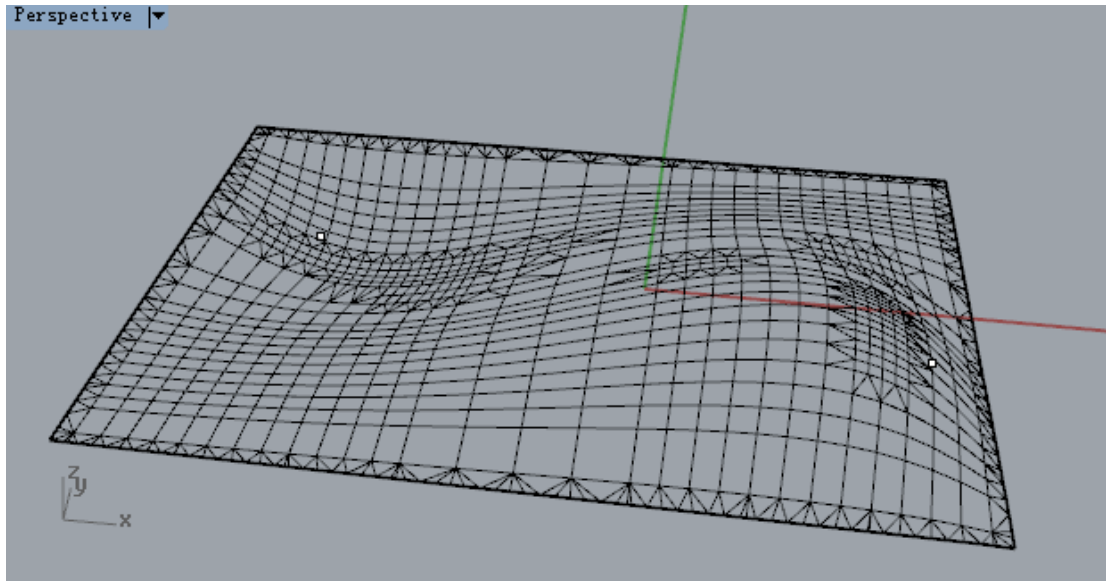


Figure 6 is smooth and slow

If you want to get high quality rendering, set this option, the number of mesh segments increases, the amount of data increases, and the render good will be longer. The density determines the distance between the polygon edge and the original surface. When the density is equal to 0, the rendering effect is the worst. Setting the density to 1 can obtain a relatively ideal rendering effect. As shown in FIG. 1-48a and B, in the rendering diagram, the surfaces of each object are very smooth and neat, without any edges or corners.

4.7 3D modeling elements

Rhino 3D combines the precision of traditional CAD with the flexibility of spline-based modeling techniques to create, edit, analyze, and transform NURBS curves, surfaces, and entities. It is not limited by complexity, order or size.

Rhino 3D has five types of data: points, lines, faces, bodies, and grids. Lines, planes, and bodies are all part of a class of objects called NURBS (non-uniform Rational b-spline Rational b-spline), which is usually seen as a mathematical equation, meaning that such objects can be very smooth. This kind of smooth surface can produce models, renderers, animation programs, etc. Just like the computer-aided manufacturing (CAM) system, some designers use line segments and grids to fit a smooth surface. Rhino 3D can also create some grids to fit NURBS objects, so as to complete the model production.

matching the direction of the curve to a curve to the other. The operation steps are shown in figure 7. Firstly, the target curve conforming to the direction is selected.

When the command line displays, select the curve to change in the view and press ENTER to complete the operation.

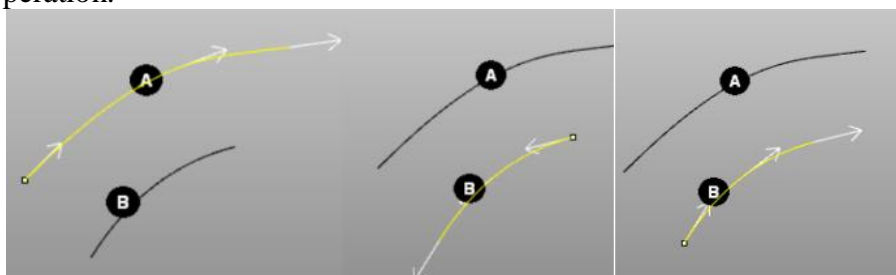


Figure 7 corresponds to the direction of the curve



set up by several section of the profile of line. The operation steps are shown in figure 8:



First, use any curvilinear command to draw several Outlines of the desired shape.

step 2 Then select the contour curve to continue to specify the starting point of the straight line used to define the section plane, which will be perpendicular to the working plane in use (it is easier to operate with orthogonal or latching points);

step 3 Continue to specify the end point of the section plane. A curve can be established through the intersection of each section plane and the contour line. Press Enter to complete the operation.

Tip: once you have several sections, Loft or other instructions can be used to create surfaces from these sections.

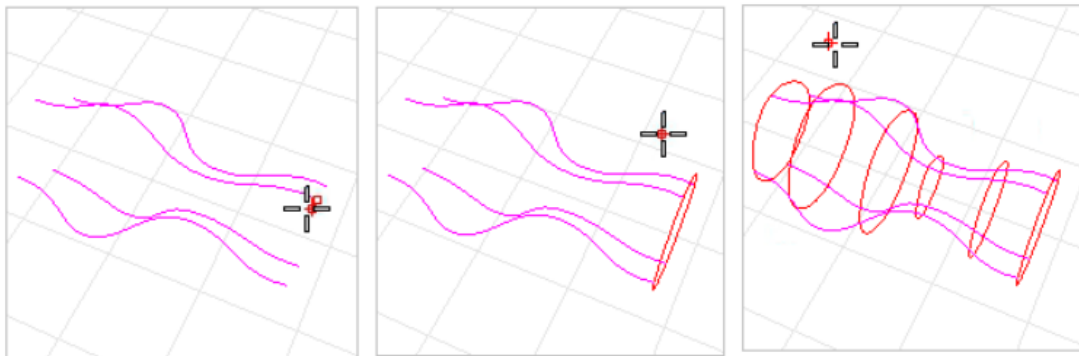


Figure 8. Curve establishment from profile of section

Right click to reconstruct the main curve. Operation steps are shown in figure7. : will a multiple surface adjacent two coplanar planes merged into a single plane. As shown in figure 9.

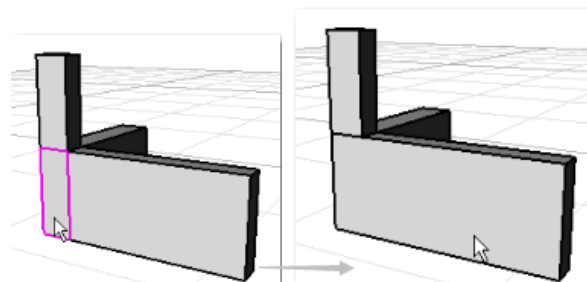


Figure 9 merges two planes of a common plane



cancel the combination of multiple surface on the edge of the selected state. As shown in figure 10.

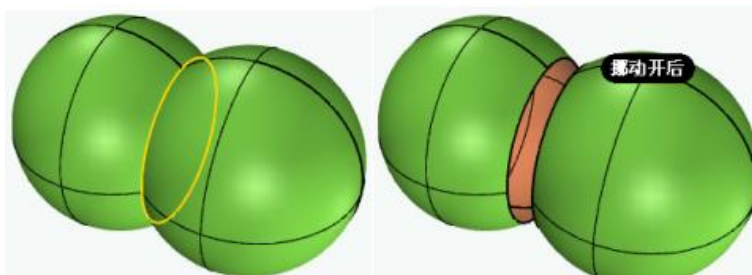


Figure 10 uncombines the edge states



on the edge of the multiple selection on the surface of different radius of the rounded surface, trim the original surface with rounded corners and surface together. As shown in figure 11.

step 1 Select the edge.

step 2 Select a joystick.

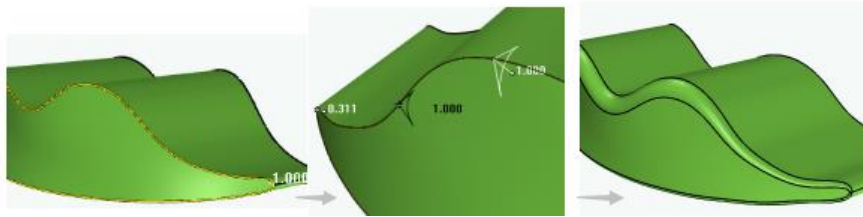


FIG. 11 rounded edges with unequal distances



on the edge of the multiple selection on the surface of the bevel of equidistant curved surface was established, the original surface trimming and bevel surface together. As shown in figure 12.

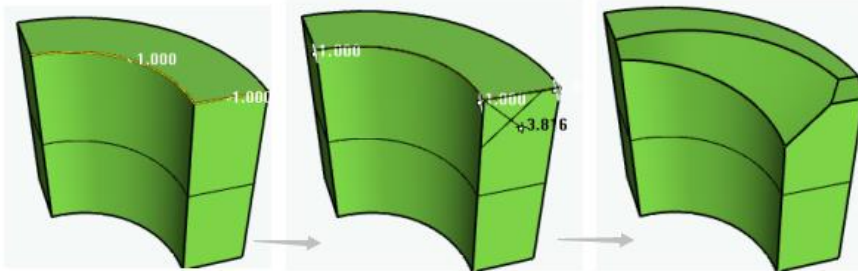


FIG. 12 oblique Angle of unequal distance edge



using open or closed curve cutting multiple surface like in high temperature wire cutting styrofoam. As shown in figure 13.

- step 1 Select a curve for cutting;
- step 2 Select a surface or multiple surfaces;
- step 3 Specify the first cut depth point, or press Enter to cut through the object.

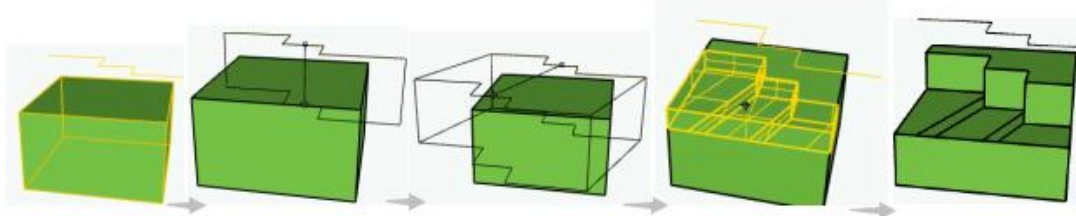


Figure 13 line cutting

mobile multiple curved face, as the adjacent surface do adjustment. This command applies to moving surfaces on simpler multiple surfaces, such as adjusting the thickness of a building wall. As shown in figure 14.

- Pick a face;
- Specifies the starting point for movement;
- Specifies the destination of the move.

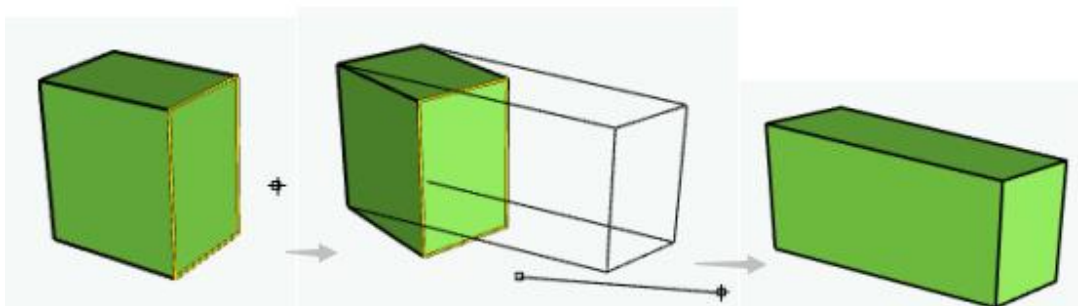


Figure 14 moves the surface



As shown in FIG. 14.

step 1

Pick a face.

step 2

Specifies the starting point for movement.

step 3

Specifies the destination of the move.

5. Expected value

This research is based on the latest and most popular virtual reality technology, and USES the easy-to-use unity development engine to develop VR teaching software for teaching. With a greater degree of innovation. The final software can use related literature course teaching, so that students can experience more intuitive teaching, improve students' interest and comprehension ability, and has certain practical value.

The expected results will be in the form of papers, research reports, gearVR teaching software. In addition, the finished software can enable students to experience more intuitive teaching and improve their interest and comprehension ability. It provides reference for the subsequent VR development of our hospital.

Acknowledgements

Project: scientific research project of wenzhou vocational and technical college in 2018 (WZY2018041).

References

- [1]Thomas Peter Kersten,Felix Tschirschwitz,Maren Lindstaedt,Simon Deggim. The historic wooden model of Solomon's Temple[J]. Journal of Cultural Heritage Management and Sustainable Development,2018,8(4).
- [2]Daniel Jansson,Susanne Wiklund Lindström,Rikard Norlin,Saphon Hok,Carlos A. Valdez,Audrey M. Williams,Armando Alcaraz,Calle Nilsson,Crister Åstot. Part 2: Forensic attribution profiling of Russian VX in food using liquid chromatography-mass spectrometry[J]. Talanta,2018,186.
- [3]Zhi Liu,Susumu Ishihara,Ying Cui,Yusheng Ji,Yoshiaki Tanaka. JET: Joint source and channel coding for error resilient virtual reality video wireless transmission[J]. Signal Processing, 2018,147.
- [4]Emily Carl,Aliza T. Stein,Andrew Levihn-Coon,Jamie R. Pogue,Barbara Rothbaum,Paul Emmelkamp,Gordon J.G. Asmundson,Per Carlbring,Mark B. Powers. Virtual reality exposure therapy for anxiety and related disorders: A meta-analysis of randomized controlled trials[J]. Journal of Anxiety Disorders,2018.
- [5]Chloé Reymond,Nina Jaffré,Nicolas Taudon,Mathilde Menneteau,Hervé Chaussard,Josiane Denis,Cédric Castellarin,Franck Dhote,Frédéric Dorandeu. Superior Efficacy of HI-6 Dimethanesulfonate Over Pralidoxime Methylsulfate Against Russian VX Poisoning in Cynomolgus Monkeys (Macaca fascicularis)[J]. Toxicology,2018.
- [6]Jangwoo Son,Eun-Seok Ryu. Tile-based 360-degree video streaming for mobile virtual reality in cyber physical system[J]. Computers and Electrical Engineering,2018,72.
- [7]Tae-Jung Kim,Jun-Ho Huh,Jin-Mo Kim. Bi-directional education contents using VR equipments and augmented reality[J]. Multimedia Tools and Applications,2018,77(22).
- [8]Xianta Jiang,Zhen Gang Xiao,Carlo Menon. Virtual grasps recognition using fusion of Leap Motion and force myography[J]. Virtual Reality,2018,22(4).