E-Learning Platform for Computer Graphics Experiment

Shang LIU

Tianjin University of Finance & Economics, Tian Jin, 300222, China
liushangw@aliyun.com

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Abstract. E-learning is a new learning model based on computer, multimedia and network, and it is based on "constructivism education theory" and "humanistic education theory". After study the limits of classical methods of computer graphic experiment learning, this paper implemented an e-learning platform. This platform includes 4 parts: the basic knowledge module, the tools and material module, the learning and communication module, and the learning evaluation module. This platform can improve the interest and enthusiasm of student. It can achieve better learning effect.

Introduction

E-learning is new learning model based on computer, multimedia and network, and which regards the teacher as a guide and the students as the main body of study. This learning-model has the following advantages: it can across the space and time, it integrates abundant resources, and by which the student can learn in his favorite method and communicated equally. Along with the development of digital technology, network technology, and multimedia technology, the idea of E-learning is proposed in the late 90's. E-learning has become the most convenient and effective learning method in these years. It has changed the learning of the concept of time and space. It allows the people can learn at anytime and anywhere by using the Internet, and share the global learning resources. It make the learning is no longer limited by the school.

The teaching theory of E-learning is based on "constructivism education theory" and "humanistic education theory". The theory of Constructivism emphasizes that learning is the active knowledge construction of learners. Learners construct their own new information by their own background and perspective, which is under the help of teachers and others. The theory of humanistic education emphasizes the development of student, highlight the main role of student, and respect the personal feelings and needs of student, which is also focused on the study meaning of personal. The principle of both theories is learner-centered. It looked the learner’s autonomy as the prerequisite, and develops the autonomous learning ability, so, the e-learning can stimulate the enthusiasm of student, and it can achieve the purpose that teaches the students in accordance with their aptitude. [7][8]

Computer graphics is an important branch of computer science. It is widely used in computer aided design, virtual reality and game development. And it is one of the important professional courses of computer science.” How to make use of these favorable resources to carry out the experimental teaching of computer graphics” is become the primary task. So, this paper builds an e-learning platform of computer graphic experiment, by which the student can get rid of all teaching activities are arranged by the teacher, and can stimulate the learning interest of student. And it can improve the teaching effect.

The Problems of Existing Teaching Mode of Computer Graphics Experiment

At present, the main methods of teaching computer graphic experiment are explain and demonstration. First the teacher explains the knowledge contents, and then demonstrates the procedure of experiments. Finally the students do the experiments by himself according to these explain and demonstration. It’s found this teaching method cannot enhance the enthusiasm of the students, and the reason is as following.

①Limits of the teaching methods
In this classic teaching method, the active is the teachers and the passive is the student. It belongs to behavior theory. The focus of this teaching procedure are behaviors appearance of the student, and aren’t the students' consciousness and internal psychology. The task of student is receiving external stimuli, and the task of the teacher is to providing an external stimulus and imparting it to students. So it cause a lot of students don’t think in learning procedure and don’t ask questions. It suppresses the students' learning enthusiasm.

② Contradiction between experiment contents and experiment time

Computer graphics experiment is a professional course. The development platform is Visual studio 2010 and the OpenGL toolkits. It includes 2 parts: the main algorithm in computer graphics and exercises based on OPENGL interface language. It needs several preorder courses, and requires the student mast a lot of mathematical methods, the knowledge of program design and data structure. But a lot of students forget the knowledge of preorder course, because this course are opened too early. Some experiments contain much knowledge, and its implement code is many lines. But the time of computer graphics is shorter, so it is difficult for some students to implement the graphics experiment and debug it. It weak the students’ confidence for learning graphics is hit, and loses the interest of this course.

③ Limits of learning reference materials

In computer experiment teaching, it always need the teacher demonstrate the implement step one by one. Only refer to the text reference, the beginner needs to spend a long time to find the specified command in the menu. To mast an exercise, it always needs the student record carefully and need the student repeat the key or difficult step several times. Even so, some student cannot competent a difficult experiment successfully by himself.

For these reasons above, this paper improve the teaching effect by implement an e-learning platform of computer graphic experiment. The reason is as follows.

① E-learning is based on humanism and constructivism theory, and it can overcomes the shortcomings of the current teaching methods. It emphasis the “learner centered" principle" in the learning process, which can to cultivate the students' subjective and improve the initiative and interest of student.

② E-learning has changed the concept of time and space. It resolved the problems of “contradiction between experiment contents and experiment time” and “Limits of teaching reference materials”. By the platform, the learning reference materials can implement global sharing. The study activities are not limited in classroom, and the student can learn anytime and anywhere. And it also make the students study according to their own saturation, and do strengthen learning for a special problem. So it can achieve better teaching effect.

E-Learning Platform for Computer Graphics Experiment Course

The modes of e-learning are as follows. ①"Situation-explore" model. It is mainly applies to classroom teaching in teaching. ②"Resource utilization-theme exploration-cooperative learning" model. It is mainly applies to the campus network environment and social science teaching. ③ "Intercollegiate cooperation remote consultation" mode. It is mainly applies to the Internet environment of distance education. ④"Special exploration - website development" model. It is mainly in the Internet environment, and to carry on extensive and in-depth study for a problem. By which it can cultivate the innovative spirit and practical ability of students and enhance their comprehensive quality.

According to the characteristics of computer graphics, the "special subject website development" mode is chose. As the "Special subject learning website", which requires must include the following contents.

①It can demonstrate the structure of the knowledge of the subject, and restructure the relevant resources which includes the text, graphics, images, and dynamic data.

②It can collect and manage the materials of learning including learning tools (dictionaries, dictionaries, pronunciation and simulation experiments), and the links to related resources.
③ The question answer and remote discussion module is constructed according to the study topic. It can collect the issues of the study topic, by which it give exercise and evaluation for learner’s online self-learning evaluation.

Corresponding to the above four contents, the main structure of the teaching platform of computer graphics experiment is designed as Figure 1.

![E-Learning platform for computer graphics experiment](image)

**Figure 1.** The structure of E-Learning platform for computer graphics experiment.

The functions of each part of these modules are as follows.

① The basic knowledge module. This module contains experiment guidelines and demos of emphasis and difficulty. The experiment guidelines are provided for learner retrieval and refer to, and its types include text, graphics, and images etc. The emphasis and difficulty demos’ type is video, by which students can track the operation easily and visually. And the interactive function make the student can learn the difficulty according to his actual situation. Student can learn a problem for a long time and repeat many times, and don’t worry about to give up the current study for learning the next knowledge point.

② The tools and material module. This module includes common tools of study, such as VC++6.0, SDK OpenGL, open source etc. and it make the student can set up the learning environment anytime and anywhere easily. Excellent graphics work can enhance the interest and improve the study enthusiasm, and its contents are as following: the Siggraph conference, the world’s famous companies, the woks of research group etc. The common website links make the student known the new trends and the hot topics of computer graphics. And the links includes http://nehe.gamedev.net/, http://groups.csail.mit.edu/graphics/education.html, etc.

③ The learning and communication module. This module is consists of 3 parts. The first is online Q & A, whose function is for issue the student questions and the teacher answers. By this way, it is not only solving the student problem, but also are references for other student. The second part is study forum. In the forum, the students can exchange learning experience and skills. The third part is information feedback. The student can provide the suggestions about the teaching methods or suggestions about the platform by this module. It can improve the teaching effect by this way.

④ The learning evaluation module. It includes stage exercises and works display. Stage exercises are for the learner to test himself after finishing stage study. The exercises of this platform are not only including the basic knowledge of computer graphic, but also including the problem which allow
the student to display their Creative and imaginative. Works display function make the student can upload his satisfaction graphic work. And it can improve the students' enthusiasm of learning computer graphic.

Summary

To solve the problems of computer graphic experiment, this paper implement an e-learning platform. This platform is based on humanism and constructivism theory, and it can resolve the problems of “contradiction between experiment contents and experiment time” and “Limits of teaching reference materials”. The e-learning platform consists of 4 parts: the basic knowledge module, the tools and material module, the learning and communication module, and the learning evaluation module. It emphasis the “learner centered” principle” in the learning process, which can to cultivate the students' subjective and improve the initiative and interest of student. It make the student can learn anytime and anywhere. It can achieve better teaching effect.

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