

Technique for Using 3D Computer Graphics in the Educational Process

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ABSTRACT

The article deals with pedagogical research related to the use of 3D computer graphics for the development of professional graphic skills of students of higher educational institutions. The above technique allows using the 3D Studio MAX package to quickly and efficiently master the design features of the displayed 3D object using the example of an object such as the building of the Urgench branch of TUIT. The technique is a step-by-step mastering of the structural features of building construction, starting with a simplified image of the head in the form of planes and ending with a photorealistic image. The technique is being experimentally tested in teaching students of the specialties "Computer Engineering", "Software Engineering"

Keywords.Teaching methodology, 3D Studio MAX, computer graphics, three-dimensional bodies, professional art and graphic skills of students.

Introduction

Teaching computer graphics - one of the most important areas of using a personal computer, is considered today as the most important component of education. Achievements in the field of ICT actualize the issues of training a specialist in the field of presenting information in the form of graphic images: drawings, diagrams, drawings, sketches, presentations, visualizations, animations, virtual worlds, etc. The professional training of future specialists in the field of computer graphics should be focused on the training of a competitive specialist in demand by the labor market in the context of the growing pace of informatization of education, the creation of a unified information environment and the formation of relevant professional competencies in the context of rapidly developing software, intellectual products and solutions in the field of ICT. Computer graphics is an area of scientific knowledge that covers technologies (tools, methods, tools) for creating computer two-dimensional and three-dimensional images of various nature (raster, vector two-dimensional, vector three-dimensional, fractal, etc.). The method of teaching computer graphics is a set of ordered knowledge about the principles, content, methods, means and forms of organizing the educational process in computer graphics.

A model of a methodology for teaching computer graphics is a set of components that describes the levels of a teaching methodology, their interrelationships, principles, methods, means and forms of organizing training in computer graphics.

Selecting Software for Implementation of the Method

For the development of the methodology, one of the important stages was the choice of a graphics package that meets the requirements of the drawing teaching methodology. The following requirements were identified as the main ones:

- a wide range of tools for modeling 3D objects;
- visualization from any point of view of the product model;
- available tools for editing the shape and proportions of the product;
- the presence of light seamless modeling;
- the use of graphic textures;
- the ability to simulate textures;

- the use of alpha maps.

As additional requirements were adopted:

- friendly interface;
- limited machine resources;
- affordable price for universities.

According to these requirements, a comparative analysis of 3D computer graphics packages (GoogleSketchUp, Autodesk Maua, Autodesk 3DS MAX, Blender, Wings3d, SweetHome 3D, SculptrisAlpha 6, KOMPAS-3D Home) was carried out, which made it possible to reveal that various programs solve similar problems, using functions under various names [1]. So, for modeling 3-dimensional objects, the following functions are used: Editable Mesh, NURBS, NURMS, Patches, FFD, subdivision surface, etc.; for the development of textures and textures - Editable Mesh, Textured, UV-coordinates, Cloth, Fur, Shag: hear (hair) and Shag: fur (fur), etc.; for modeling with splines - Graph, Bezier splines, etc.; fast rendering - VIPER, Rebuilt Renderer, IPR, Render Region, etc.

As a result of the analysis of graphic packages according to the indicated characteristics, an obvious advantage of the 3DS Max system was revealed. This package is used for 3D geometric modeling of objects by many specialized universities in Uzbekistan. 3DS MAX has a whole set of tools suitable for modeling organic objects (Editable Mesh, NURBS, NURMS, Patches, Surface, etc.), not inferior to competing programs, and has the lowest price. Thus, it was 3DS MAX that was adopted as the environment for the functioning of the developed technique.

Basic Provisions of the Procedure

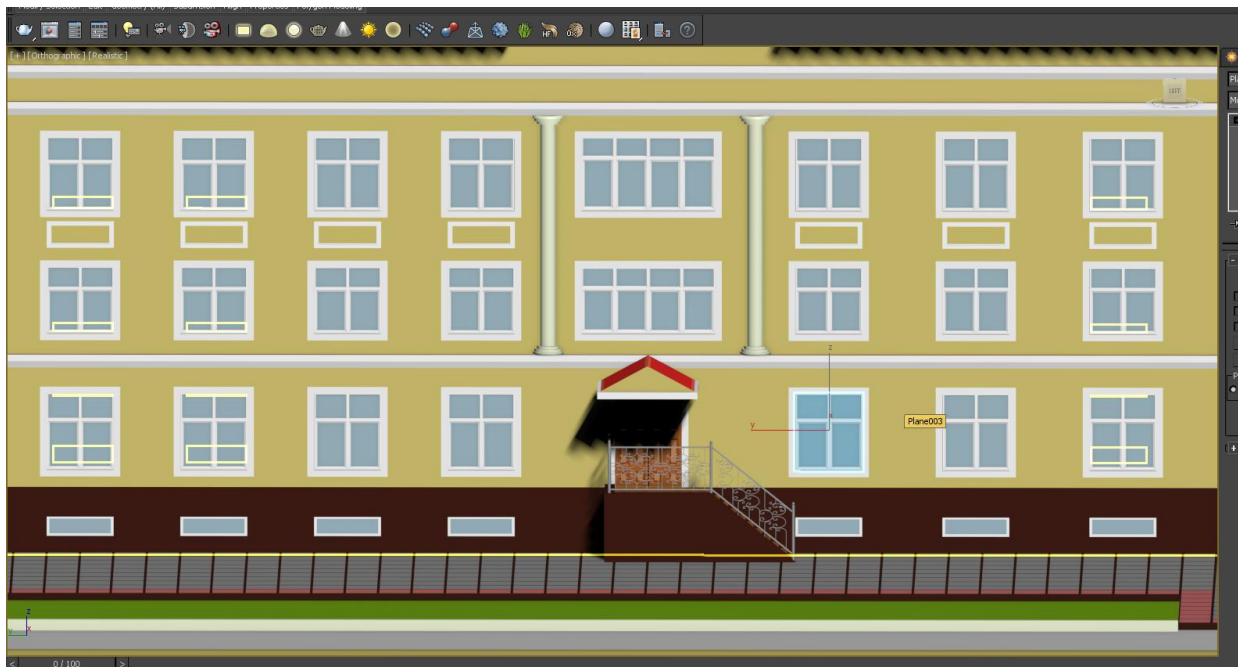
The methodology consists of the main theoretical provisions, a training scenario, a demonstration film, methodological instructions, an educational version of the 3DS Max package, a set of tasks that take into account the individual abilities of students, as well as tools for assessing learning outcomes. In general, the learning scenario can be represented as a sequence of the following four stages.

1. Modeling is one of the main stages of work, requiring significant skills and knowledge of the basic commands and tools of the 3Ds Max environment. Initially, the campus models of the Urgench branch of TUIT are created (Pic. 1).



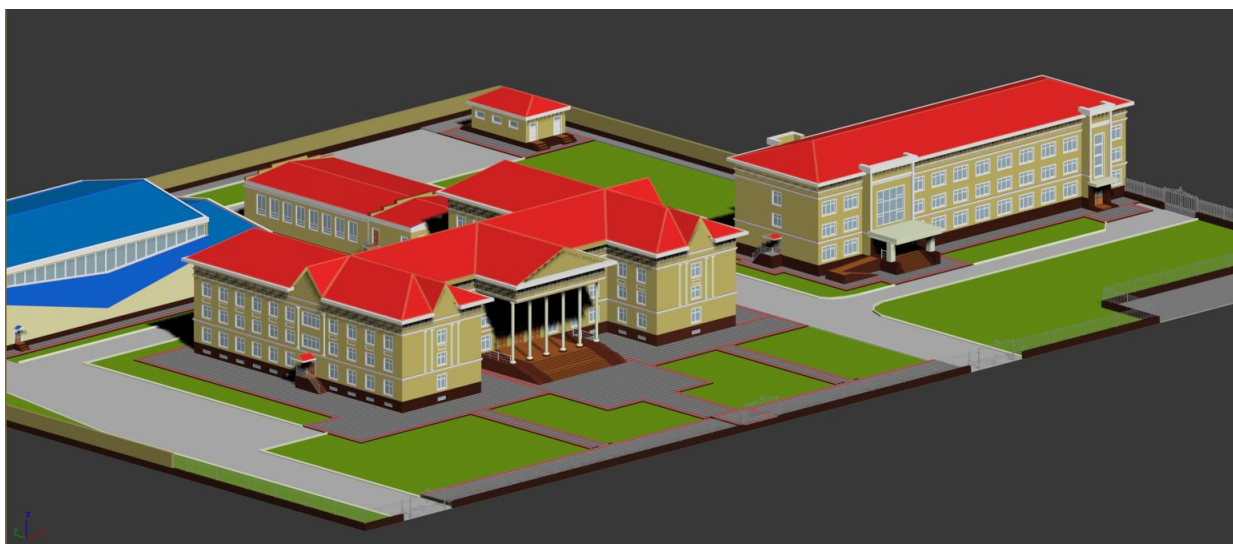
Picture 1. Building modeling

2. Appointment of materials. The reality of the resulting object largely depends on the materials used and the texture maps used in them - images imitating the texture of wood, stone, water surface, etc. At this stage, we assign materials as windows, gratings, grass (Pic. 2).



Picture 2. Purpose of materials

3. Setting up light sources and cameras. This stage consists in setting up a physical camera and installing light sources (Pic. 3).



Picture 3. Arrangement of light sources and cameras

4. Visualization is the final stage, which consists in setting the quality of the resulting "picture", the size and type of generated frames, as well as adding special effects.

The entire learning process using the proposed methodology takes from 20 to 24 hours of classroom training. Taking into account the developed detailed methodological instructions and

demonstration videos showing both the entire learning process and its individual stages, when using the methodology, students do not need to study the 3DS MAX package in advance, but only need general information about working with graphic packages. For the sake of fairness, it should be noted that the 3DS MAX package has much more possibilities for modeling spatial objects than is used in the developed methodology. However, the means used are sufficient to obtain the desired result - a more effective and in-depth development of the design features of the model being developed.

Conclusion

The application of the proposed methodology in the process of conducting classes in architectural, art and technical universities that train students-architects, artists and designers will facilitate the process of understanding by the student such a complex spatial object as a building.

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