



PRACTICAL APPLICATION OF COMPUTER SOFTWARE IN VISUAL EDUCATION

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Abstract: Education is an active process in which instructors apply various devices to make the material to be taught more suitable for students' perception. As the capabilities of available devices improve, so should the methods of teaching make the best use of them. No tool can ever replace an instructor, but tools can enhance the efficiency of education. Involving computers in the process of teaching is feasible only when it can actually provide new educational methods that were unavailable before, due to time or material limitations. In my article I'd like to introduce two such new methods that, when used together with traditional methods, can support visual education by increasing the number of possible approaches to a topic being taught. One of these methods is about teaching color theory, while the other is about shadows.

Zusammenfassung: Der Unterricht, die Erziehung sind solche aktive Vorgänge, bei denen die Pädagogen versuchen das Lernmaterial für das Wahrnehmen und fürs Beobachten mit der Hilfe der verschiedenen Mittel ergreifbar zu machen. Die Anwendung der Computer als Unterrichtsmittel blickt auf keine lange Vergangenheit zurück, ihre Verbreitung hat aber diese Möglichkeit zustande gebracht. Die direkte Anwendung der Computerprogramme im Unterricht hat nur dann Sinn, wenn wir mit deren Hilfe solche Methoden im Unterrichtsvorgang einführen können, die früher wegen Mangel an Zeit, Mittel, Material nicht anwesend sein konnten. In dieser Abhandlung stelle ich zwei Möglichkeiten vor, die neben den traditionellen Unterrichtsmitteln angewandt, neue Möglichkeiten schaffen zur Annäherung des untersuchten Fragekreises aus mehreren Gesichtspunkten, eine im Unterricht der Farbenlehre, eine im Unterricht des Schattens.

Keywords: shadow, colors, color theory

1. Introduction

The goal of visual education is to help students acquire visual reception, cognition and communication, demonstrate devices of visual expression and improve students' vision. The instructor's task is to demonstrate methods of visual communication, as well as different possibilities for artistically representing a subject. After analysing relations of form and function, material and structure, students should be capable of innovative thinking and creativity.

Throughout the process of education, instructors apply a wide variety of devices to make the material to be taught more suitable for students' perception and observation. One of those devices is the utilization of computer software. Computer-based creative work has a lot of potential in teaching drawing: teacher presentations, frontal work and student lectures can all be made more spectacular by exploiting possibilities offered by electronic devices and software.

My goal is to demonstrate how graphics software can be utilized to support elementary and high school level education. For that purpose, I've chosen to introduce two programs: Adobe Photoshop and 3D Max.

2. Advantages of Graphics Software

2.1. Adobe Photoshop

The most important characteristic of the software is that it divides up any image to a grid of pixels, small rectangles that act as independent units on their own. One usually works with a number of pixels at the same time, but when necessary, the traits of each pixel can also be adjusted individually.

Practical Application of Computer Software in Visual Education

Adobe Photoshop is an ideal companion for teaching color theory, as changing the coloration of a picture is made really quick and easy. Tone, saturation, brightness and the substance of a certain color can be altered by just a few clicks of the mouse.

2.2. 3D-Max

An excellent program for modeling, rendering and animating 3D images. Users need to input a virtual 3D model of the subject into the computer. Once this is done, it can be rotated or placed anywhere, viewed from any virtual camera angle, just like it was a real object. The model's substance and lighting can also be modified. For lighting, we can adjust the type and strength of light as well as the position of the light source.

Once all the options are set, we can save pictures or an animation of the virtual object. This way, students can use the saved files anytime to review the material taught in class.

Advantages of using graphics software:

- effects of changes made by the user can be seen at once
- unlimited possibilities for modifications
- unlimited potential for improvement
- projects can be restarted by the user anytime
- modifications can be undone
- amusement and creativity are emphasized
- projects can be reviewed anytime

3. Practical Application

Now, let's have a look at a few practical examples as to how different topics in visual education can be worked out in class using the new computer-based methods.

3.1 Color Theory

Teaching color theory is impossible without making students actually compose pictures on their own. A student needs to create and modify at least 15 to 20 pictures in order to gain sufficient experience to handle coloration effectively. Usually there just isn't enough time in class to produce a large amount of pictures by traditional methods.

Besides, there are technical limitations as well. When making colored pictures by aquarelle, tempera or pastel, painted colors cannot quite be modified or made lighter afterwards without losing the freshness of the picture. Even in the case of oil and acrylic paint, it's hard to make a significant change in the coloration of the painting because the pigments tend to mingle and this usually results in faded colors. These problems do not arise if the picture is handled digitally.

With the help of a computer, students are able to produce and analyze a whole series of pictures in about the same time it would take to create a single picture by traditional methods. Working with a digital series of pictures does not only allow for putting the information learned about color theory into practical use, but it also helps improve students' observation, visual memory and artistic creativity.

During the education process, instructors need to take a step-by-step approach by starting from the basics and gradually teaching a higher and higher level of application for recurring information. Once the essentials are settled, students should also gain knowledge of the practical characteristics and effects of colors, since the goal is to learn how to put theory into practice.

Using Photoshop in presentations is recommended as early as in elementary school. High school students can use the software on their own: they can experiment with color effects, change certain characteristics to create contrasts and achieve a harmony of colors.



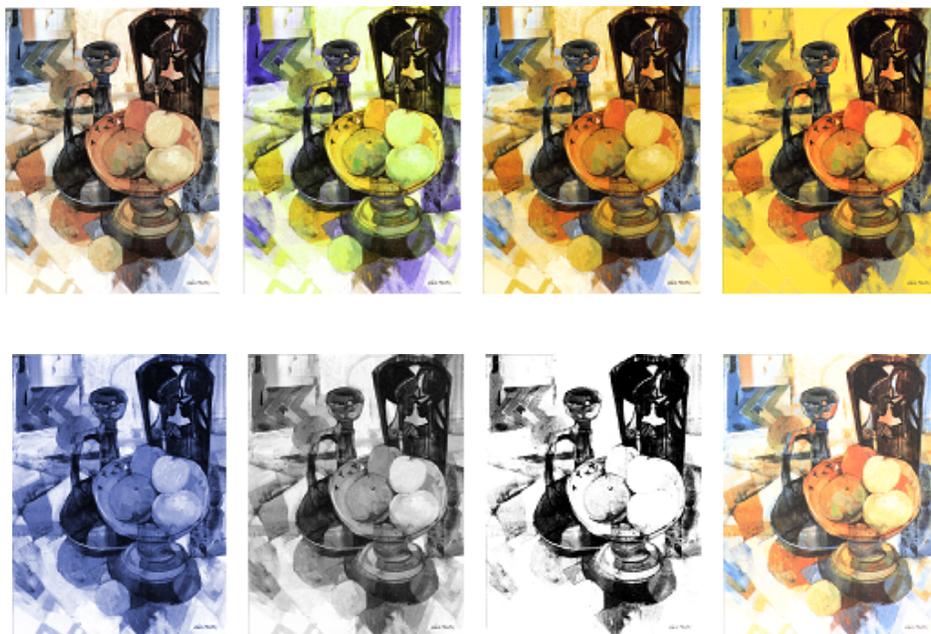
Picture 1. Variations of colors

Utilizing the potential offered by the software, altering coloration is a quick and easy process. Tone, saturation, brightness and the substance of any given color can all be modified.



Picture 2. Variations of colors

As pictures can quickly be modified or deleted, students are encouraged to try and experiment freely with the colors. They can be motivated by personal involvement and manipulating their own work. The software has considerable efficiency in improving students' ability to create a work of art on their own.



Picture 3. Variations of colors

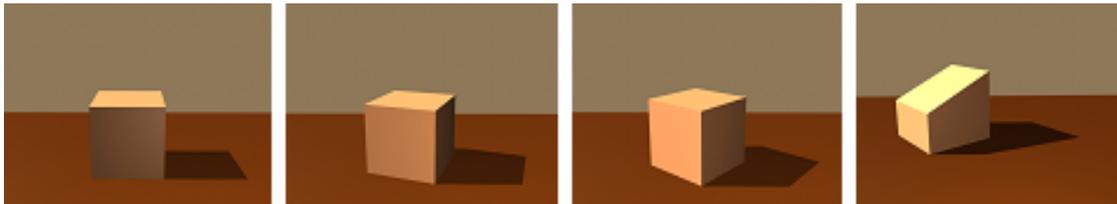
3.2. Shadows

A shadow is an important part of an object's visual representation and an element of the composition as a whole. When creating a drawing, the technique known as toning is applied to produce a shadow that is realistic both geometrically and as part of the composition. While a well-drawn shadow gives a true-to-life appearance to an object, a poorly drawn one has the opposite effect.

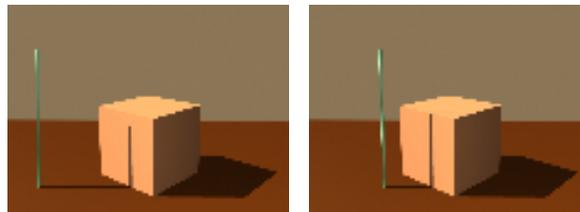
While students are mostly familiar with the different types of shadows (self-shadow, cast shadow etc.), the types of light (natural and artificial light) and light's nature (natural light has parallel rays, while an artificial light source is central), in many cases they have trouble drawing the shadow in accordance with the light source in question. This is due to the unfortunate fact that most students lack real, first-hand experience regarding the formation of shadows, because the tools needed to create different lighting effects to demonstrate how different types of shadows are formed are not available in classrooms.

However, such problems can be overcome by using the software 3D Max, which puts a wide variety of modeling and animating functions at the user's disposal. Virtual objects created with the program are 3-dimensional and have exactly the same characteristics as real objects would. Users can "walk" around them, view them from any angle, and they can be rotated in any direction. Apart from this, users can also set up a light source of the desired type and strength in any position they like.

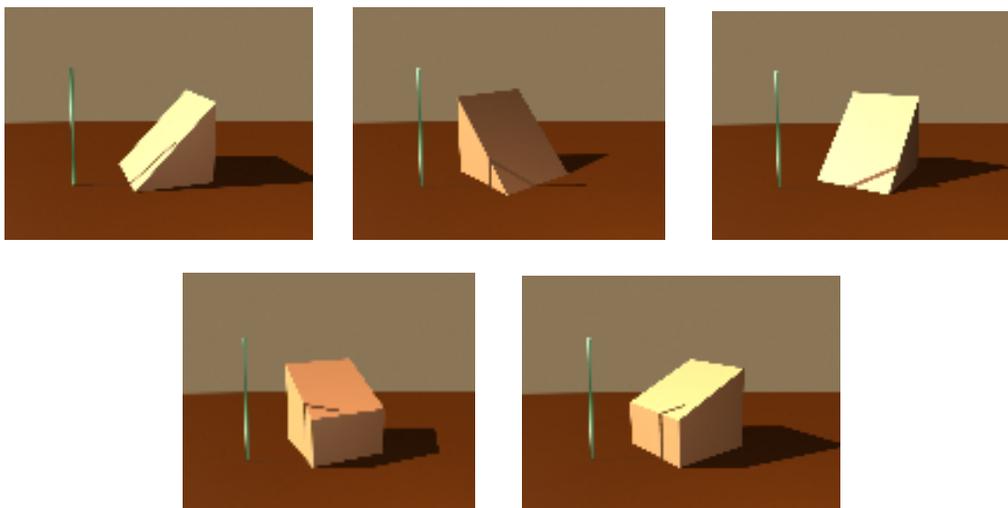
In the following examples, the position of the light source is fixed, but the objects' shape and position is modified.



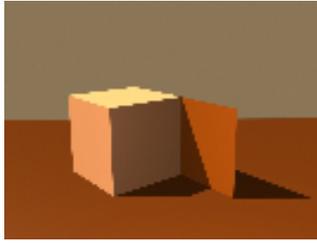
Picture 4. Shadow of Cube and Truncated Cube



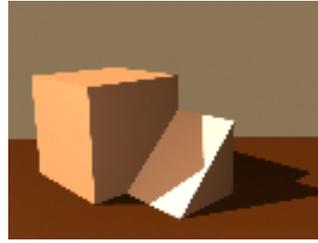
Picture 5. Shadow Cast by Rod on Cube



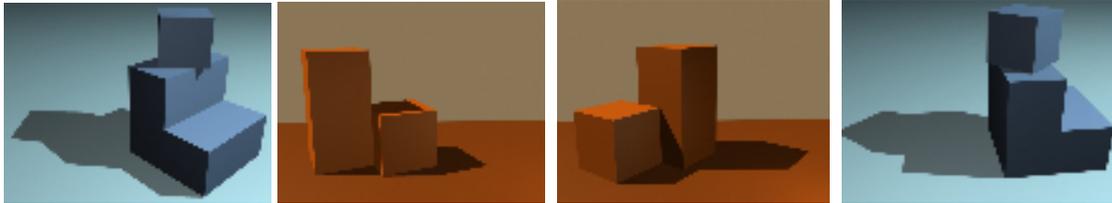
Picture 6. Shadow Cast by Rod on Oblique Plane



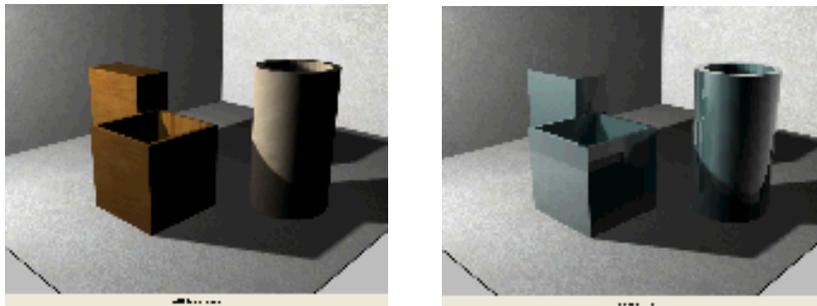
Picture 7. *Shadow Cast by Flat-Sided Object on Vertical Plane*



Picture 8. *Shadow Cast by Flat-Sided Object on Oblique Plane*

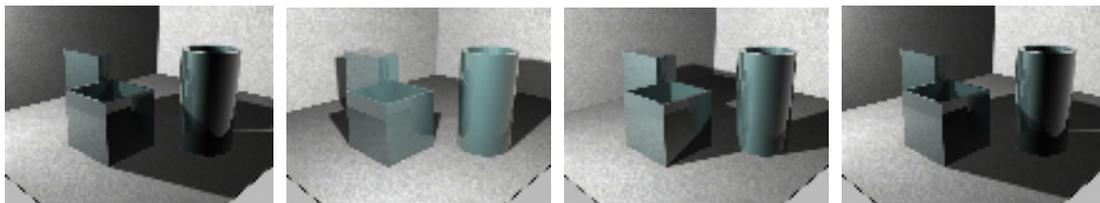


Picture 9. *Shadows of Flat-Sided Objects*



Picture 10. *Variations for Substance*

In the next example, the perspective is fixed, but the strength and direction of light is altered. By watching the animation, one can observe the way shadows change. The animation can be paused at any moment, allowing the user to study the momentary lighting conditions and save stills from the video. Reflections are clearly visible on the surface of objects consisting of glassy or metallic substance. When analyzing a group of objects in class, each student can see them from the exact same perspective thanks to the software.



Picture 11. *Shadows Cast by a Group of Geometrical Objects*

In my experience, using 3D Max in class can significantly improve students' skills of observation and visual memory. Later on, they tend to have less trouble drawing shadows, which results in well-detailed, more realistic drawings.

3. Conclusion

The application of computer software in education may considerably improve students' perception, visual memory and sensitivity. We might as well say that students' ability to create a piece of art on their own is enhanced by the use of a computer.

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