Realization of Fractal Art Pattern Composition Based on Photoshop Software

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Abstract. In the era of the rapid development of information civilization, people pay more and more attention to the function of computer, and computer art. In the research theory of art education in our country, computer art only occupies a small part, and the research on teaching in university computer art education is rarely involved. This paper mainly analyzes the necessity of computer art teaching in general university and summarizes the advantages of computer art software compared with other contents as a novel and practical computer art software Photoshop. Through the analysis of the teaching material and the present situation, it is found that computer art is difficult to develop in the university classroom, so it is proposed to optimize the computer art curriculum in the university by teaching inquiry. This study focuses on the application of graphic software Photoshop in the art teaching of university by using literature method, experimental method and comparative analysis method, thus promoting the development of computer art in university art education.

1 INTRODUCTION

There is no denying that the century is an era of computers, people's lives have long been closely linked with computers. The more extensive impact is the birth of the Internet and a variety of high-tech products that follow the computer. In university practice, you can often see university students with a variety of high-tech products in use, these high-tech products in their lives for entertainment and learning, which cannot be received, relevant results proposed by Clothier et al. [1, 2]. For example, in an art class to create paintings, the teacher will ask students to create according to the materials they like. At this time, they will see many students searching for the materials they need to complete their work through mobile phones, tablets, and other tools, relevant results proposed by Brownrigg et al. [3]. It can be seen that the use of high technology to assist art teaching is very necessary but also a favorite way of students. Photoshop application examples in computer art painting is given in Figure 1.

The author realizes that the computer art includes computer painting and computer design, so it should belong to two content series in the course standard: design technology and new media art [4]. Computer art has opened up a new field of art, combining new high-tech technology, but also involves the basis of design and aesthetics, and belongs to the most popular visual culture. Art courses should be in line with the trend in today, the traditional appreciation and painting is important. However, the appeal to students is no longer comparable to the new generation of curriculum resources, relevant results proposed by Yeon et al. [5]. Software Photoshop as a well-known image processing software, its functions are very powerful, widely used in digital photo processing, poster design, packaging design, logo design, web page production and many other design fields. [6, 7]. Therefore, software Photoshop is often used as the software that must be involved in the computer art class, and the in-depth study of its teaching will inevitably have a certain impact on the computer beauty teaching.

Figure 1: Photoshop application examples in computer art painting.

2   PAGE SETUPIMPORTANCE OF PHOTOSHOP IN COMPUTER ART PAINTING

### 2.1   Brief Introduction to Photoshop

When it comes to Photoshop, everyone is familiar, but most people still know Photoshop as "it is a good image editing software," and do not understand its many applications. Photoshop mainly processes digital images made up of pixels. With its numerous editing and drawing tools, it can be used to edit pictures effectively. Photoshop has many functions, such as image, graphics, text, video, publishing and so on. A new image point value of G(x,y) is formed after sharpening of each image point (x,y).

$$G(x,y) = \begin{cases} G\big[f(x,y)\big] + \alpha, G\big[f(x,y)\big] \geq T \\ f(x,y), otherwise \end{cases}$$

(1)

The processing function of Photoshop to plane image is the most characteristic application, its function can be divided into image editing, image synthesis, color correction and special effect making. Among them, image editing is the basis of image processing. Designers can do image processing such as zoom, rotation, tilt, mirror image, perspective and so on, but also they can copy, repair, delete and so on. Image synthesis is an important function of image creation, it is to re-process the existing image materials according to a certain design intention to create a new image works. Color correction, special effects and so on is to carry on the diversification effect processing to the image, which causes the image to present the rich visual effect.

$$G\left[f\left(x,y\right)\right]=\left|f\left(x,y\right)-f\left(x+1,y+1\right)\right|$$
$$+\left|f\left(x+1,y\right)-f\left(x,y+1\right)\right| \tag{2}$$

In short, Photoshop is very powerful, and it also covers a wide range of areas. Graphic design, typesetting, photography, animation, dye, illustration and so on, is photography, design, printing, animation, website and other industries in the indispensable application software [5]. This is a very powerful basic graphics software, and it has a very simple interface and a very high-end computer technology. In addition, it has been developing feature plug-ins, so anyone can find their own use. Photoshop's flow in computer art painting is given in Figure 2.
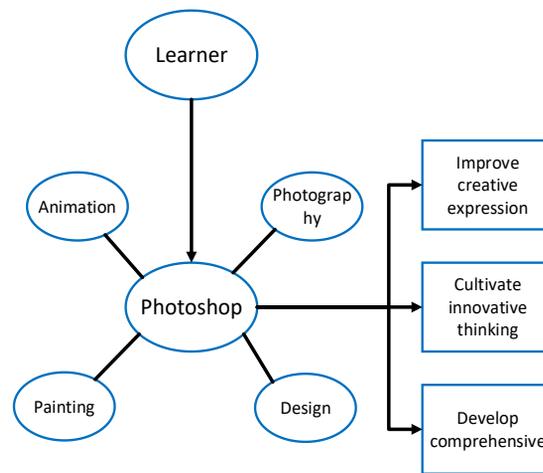
Figure 2: Photoshop's flow in computer art painting.

2.2   Advantages of Photoshop in Computer Art Painting

The emergence of Photoshop in the means, ideas or methods, has a profound impact on computer art. With the development of computer technology, the functions of Photoshop software become more and more complete and powerful, from simple graphic design to complex image processing, 3D graphics rendering, even animation design, film and television editing can be applied. Photoshop has played an important role in modern daily life, relevant results proposed by Zhu et al. [8]. Based on the university computer art curriculum development, university computer art teaching has obvious advantages:

The characteristics of Photoshop are obvious practicality, independence, subjectivity and so on. Photoshop is a very popular graphics and image software, most people in life more or less will use some, so in the students of its operation has a certain foundation, such characteristics are not available in other software, So, that teachers cannot spend too much time on the operation of teaching. The pixel value g(x,y) at the output image (x,y) point after scaling corresponds to the pixel value (u,v) at coordinates (u,v) in the original image.

$$g\left(x,y\right)=f\left(u,v\right)=bt_{1}+(1-b)\,t_{2} \tag{3}$$

Operation is simple, creative flexibility is strong, very development of human creativity. Photoshop is a graphical software facing the public, it has a simple operating system and interface. Compared with professional 3D animation software and video software, it is very approachable, and it will not let students because of the high degree of professional difficulty to extinguish their enthusiasm for

learning, which can help students to understand the characteristics of the software and promote the current learning.

$$t_1 = af(u+1, v+1) + (1-a)f(u, v+1)$$
$$t_2 = af(u+1, v+1) + (1-a)f(u, v)$$
$$a = u - [u]$$
$$b = v - [v]$$

(4)

Strong practicability and high application rate of life. Photoshop teaching can enrich the students' study life, connect the training of design thinking, software operation and other skills, and also connect the study with life, which is conducive to the acquisition of students' direct experience and knowledge [9]. Because of its maneuverability, it does not seem to have been forgotten in other ways. Improving the life skills of art knowledge has been the goal and requirement of art education, which is a good way to apply the art knowledge to life. For ordinary university students, the ability to become an art professional in the future is only a small part, such as animation, video production, network and other aspects, and graphics software Photoshop has a wide range of applications. You can use it in your work and your life. For a continuous image function f(x,y), its gradient at point (x,y) can be defined as a vector:

$$\nabla f(x, y) = [G_x, G_y]^T = \left[\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}\right]^T$$

(5)

Low requirements for teaching conditions, which can be applied to the teaching environment of university. Photoshop has low requirements for computer hardware equipment, general ordinary computers can carry the operation of Photoshop, and general schools can only have computers to meet the teaching requirements. Photoshop is well known to most people, and the vast majority of teachers are able to master software skills. The software features of Photoshop have developed very mature, can achieve any effect, it is easy to cooperate with the creative development.

$$|\nabla f(x, y)| = \sqrt{(G_x^2 + G_y^2)} = \sqrt{\{[f(x, y) - f(x+1, y)]^2 + [f(x, y) - f(x, y+1)]^2\}}$$

(6)

To sum up, the author believes that Photoshop teaching should be strengthened in university computer art curriculum, expanding its diversified forms. Taking Photoshop as the basic teaching and starting point of computer art can improve the teaching efficiency of computer art in university.

2.3   Design Principles of Photoshop

The imperfection of art teaching equipment has been the common status of art education, and the requirements of computer art for teaching equipment are higher than other art courses. Modern teaching for teaching equipment is gradually increasing, so the basic teaching equipment in the school has been set up relatively perfect, such as computer art with the most relevant computer classroom has basically been popularized in primary and secondary schools. The computer classroom is only a basic teaching equipment to the computer art, but it is difficult to realize the higher requirement on the basis of the current teaching condition. Teachers should not be restricted by the conditions to avoid this part of the study. They can use the existing conditions to explore, flexible use of convenient facilities to achieve the purpose of teaching, and reduce the requirements of teaching conditions, so that the classroom is more efficient and fast. For digital images, the second-order partial derivative of f(x,y) can be expressed as:

$$\nabla^2 f(x,y) = \left[\frac{\partial^2 f}{\partial^2 x}, \frac{\partial^2 f}{\partial^2 y} \right]^T \tag{7}$$

For example, on the issue of importing materials into computers, there are two ways to turn manuscripts into electronic materials, one is to input them into computers through scanners, and the other is to draw them directly on computers using hand-painted boards. But both methods require additional school scanners and hand-painted panels, which most schools cannot meet. This situation should seek a faster and more convenient way and make full use of the resources available at hand.

$$\frac{\partial^2 f}{\partial^2 x} = \left[f(x+1,y) - f(x,y) \right] - \left[f(x,y) - f(x-1,y) \right]$$
$$= f(x+1,y) - 2f(x,y) + f(x-1,y) \tag{8}$$

There is a tendency in modern computer art teaching, that is, to concentrate on explaining the use of software, thus neglecting the elaboration of artistic interest and creative forms. Even the textbook of computer art module in the new curriculum is this model. So that the case in the textbook is too much emphasis on the procedural operation of the explanation. Teaching theory cannot deviate from the actual situation, so the characteristics of the teacher should be taken into account in the teaching process. Due to university stress, we cannot spend a lot of time to learn a wide range of operational skills.

For software operation, teachers should be good at guiding students to learn independently, improve their interest, by driving them to explore the form of expression of the work, causing them to be able to independently find solutions in the process of software operation.

In the university classroom teaching practice, the author found that the university students' attitude towards the art classroom is mostly interested and useful to them to listen to the content. The university age stage already has certain values, they are no longer like the primary and middle school students pay attention to all aspects of interest cultivation. Due to their heavy academic background, they do not want to spend too much time in what they think is useless to them. In the teaching materials, the computer painting and computer design are separated independently, the connection is not strong, so that the students learn to forget, and it is difficult to apply to life, plus the tension of art class, so we can combine the two content together to set up the curriculum. The Effect of Photoshop on Scholars in Computer Art Painting is given in Figure 3.

The combination of computer painting and computer design can help students to carry out a systematic learning process, such as using their own computer paintings as materials for computer design, thus enhancing their practicability. It expands the students' thinking about using Photoshop. In addition, the application of computer painting works in computer design deepens the process of students participating in the completion of the whole work. Students can simulate the design process of designers instead of copying and imitating existing materials, from the conception of the work to the self-determination of the material to the completion of the work. In order to inspire their creative inspiration, enhance creativity.

3 PRACTICAL EXPLORATION OF PHOTOSHOP IN COMPUTER ART PAINTING

On the basis of Photoshop and the main creative media, through the combination of other forms of content, learners can cultivate the ability of creative expression, innovative thinking, comprehensive application, so as to achieve the curriculum goal of art education. Application of Photoshop in Computer Art Painting is given in Figure 4. With using the Photoshop, the ability in the computer art painting can be improved greatly.
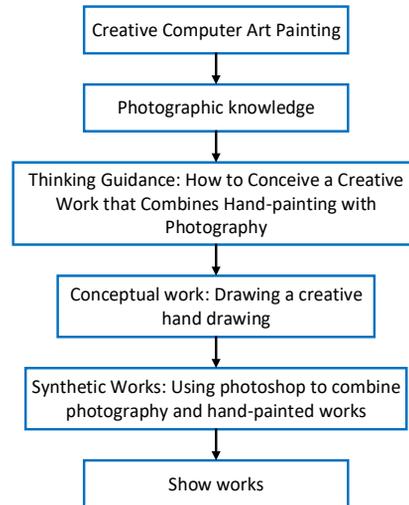
**Figure 3**: The Effect of Photoshop on scholars in computer art painting.

Figure 4: Application of Photoshop in computer art painting.

Photoshop's model in computer painting art is based on Photoshop and the main creative medium. Through the combination with other forms of content, learners can develop the ability of creative expression, innovative thinking, comprehensive application, etc., thus achieving the goal of art education. The design concept of Photoshop in computer painting art is shown in Figure 5.

3.1 Several Requirements for the Practice of Photoshop in Computer Art Painting

Software operation technology in Photoshop teaching is indispensable, but it can never be formalized. The key point is how to achieve the goal through software. The method of operation can be flexibly learned through the process of accomplishing the goal, and the situation of "taking

the opposite" can be utilized. For example, the method of the map used this time can be used in the place where the map is needed later.
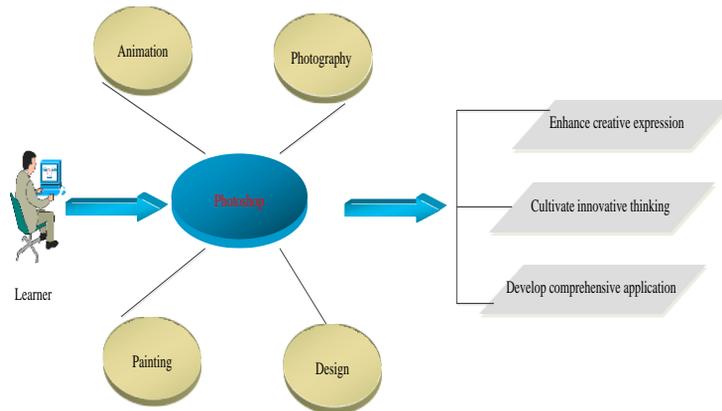
Figure 5: Photoshop's design concept in computer painting art.

Photoshop is widely used in real life and is closely related to real life. Therefore, when choosing a theme, you must choose the project that is most close to life application. This kind of theme is more attractive to students, more convincing, and students will be more active and willing to invest. You will also actively consolidate and practice, and discover the fun and interest from it, and also encourage to independently improve the operation ability of the software.

The difficulty of Photoshop in computer art painting is not only higher than the students' existing knowledge and skill base, but also can be achieved through certain efforts. We know that the learning and mastery of any knowledge and skills is a rising process from low to high, from simple to complex, and the computer art discipline is no exception. Therefore, in order to develop higher capabilities, it is necessary to properly grasp the establishment of the subject, and not only can apply its own knowledge, but also have certain challenges. If the content of the subject is set too easily, it will reduce the interest and the improvement of its ability. In addition, it is necessary to take care of different levels of capacity improvement.

In the same topic, it needs to encourage the selection of different creative objects, and inspire to combine their own experiences and emotions to conceive the works. You need to listen carefully to the difficulties in software operation and guide the self-exploration of some problems. There are several ways to operate the same effect in Photoshop, so you can't follow the steps completely, which will reduce the possibility of exploring other ways. In combination with specific teaching objectives and teaching content, we should respect the choice as much as possible and encourage diversified development, so that the created works can present more thoughts and emotions.

3.2   Application of Tone Separation Technique in Computer Art Painting Watercolor

As far as the art of watercolor painting is concerned, the ontology language is determined by the material properties of the species, which is different from the language features of other paintings. Wu Guanzhong, a watercolor master, said: "Watercolor, its characteristics are in water and color. It does not play the strength of water, it is not as strong as oil painting and pink painting; it does not play the characteristics of color, but it is inferior to the charm of ink painting. But it is wonderful in the combination of water and color." The body language of watercolor is the combination of water and color. The strengthening of traditional watercolor ontology language mainly relies on the use of media materials. The use of new media materials can broaden the water-based language of watercolor.

As far as the contemporary society we live in, the consistency of commodity forms has brought the distance between people of different classes to some extent. The technological innovation brought about by social development has not only changed people's in a short time, but also has changed people's ideas. Mechanically manufactured goods are no longer unique, and the items used in people's lives are mostly the same things that are created by thousands. Since large-scale industrial production has such a large impact on our lives, why not use this social phenomenon and re-create art?

Based on this, it is necessary to extract the current phenomenon of social digitalization and convergence, and explore and study the mechanical replication language of computer programs and the fusion of watercolor language.

Pixels are the notes in my picture. They are size-independent and form the shape of the entire character and scene. I did some exploratory attempts before I decided to use pixels as the language of expression. If the method of color separation is used, the picture will produce a texture of painting. These languages of different sizes and simple forms have opened up a new world of watercolor language.

Through the translation of the computer program, the image of the character has a unique charm. The area, color and shape of the pixel in the picture have changed greatly. After the translation of the pixel, the hierarchical relationship between the character and the scene in the original picture changes completely. The color of the characters in the painting becomes simple, and the nearly flat puzzle effect makes the theme character have a visual effect between real and illusory. In the work "Urban Girl", we can see the unique hard-edged language of computer programs. There are many color-level blocks in the picture. It is these blunt color blocks that constitute the characteristics of this digital technology language. The artistic concept presented to the viewer is compatible. These seemingly unconsidered compositions and stylings give the picture a more free and generalized character. Due to the use of computer programming language, the personal passion and brushstrokes in the picture disappear completely, replaced by the cold and mechanical language features of computer software, which is different from the unrestrained and casual of traditional watercolor brush touches. In the creation, it avoids the similarity with the realistic depiction of realistic oil painting, and pursues an artistic interest that is empty and quiet and has the pulse of the times. In the depiction of objective reality, watercolor does not have the advantage of oil painting. If the medium of gouache is used, it will fall into the cliché of advertising. However, its advantages are reflected in the deep and indescribable nature of the water-based language, fully demonstrating the object's agility.

After depicting the Photoshop tonal separation technique, the painter's main task is to convert the color-synthesized image onto the drawing paper and use the watercolor brush to fill the already-divided piece of color one by one. In the area, the colors are strictly distributed in the sketch frame to avoid running around. All pens are controlled in a rational, orderly square stroke. This mechanical, angular use of the pen caused the excessive color of the picture. This stiffness is a shortcoming of being criticized, but after being processed by Photoshop software, it is transformed into an orderly and rational new one.

4 THE ENLIGHTENMENT OF PHOTOSHOP APPLICATION IN COMPUTER ART WATERCOLOR PAINTING

4.1 Digital Technology has Spawned a New Watercolor Language

In the future society, with the development of digital technology, there will be more artistic expressions. Watercolor masters are also responsible for promoting the prosperity and development of watercolor painting while mastering and learning the traditional expression of watercolor. Therefore, with the visual language mode of digital technology, it has an expanding role in the creation ideas and performance techniques of watercolor painting. At present,

watercolor painting is advancing toward a diversified development path. By referring to the highly characteristic form of digital software imaging language as the carrier of personal watercolor painting language, it is an element that expresses the living conditions and social meteorology of the contemporary public. Through the use of this element, the work revives the spirit of the times and is more contemporary [10].

The aesthetic way of people changes with the development of science and technology in the times. In the past, watercolor has always been a simple and easy-to-use painting material. In the UK, it is a spiritual cultivation course for the children of the upper class. The water is smooth, the color is refined, the pen is free and easy, and the creation process reflects randomness and lyricism. Nowadays, portraits of celebrities previously published in newspapers or magazines can also be used as new emotional expressions of watercolor paintings through digital software processing, for example, in "Urban Girls" and "Nude Women", "Idols - Birds". The material image pixel familiar to the public is used as a creative medium, indicating that the expression language in digital software can enter the creation of contemporary watercolor painting. Through this kind of processing, the viewer is faced with the image of these characters being decomposed and extracted to comprehend the imposing atmosphere of the author and the change of technology to people's life. Through this expression technique to explore the linguistic features of the new era of watercolor art is also in line with the author's creative concept [11]. The use of digital imaging language in works, this expression can also cause a resonance of the way people view images in the era of industrialization and information. This expression language re-expands the aesthetic taste of traditional watercolor language. With the development of digital technology, more watercolor expression languages will be opened and discovered.

4.2   Digital Technology Effect is a New Enlightenment of Watercolor Expression

Our era has entered a period of highly developed and applied science and technology, and digital technology has penetrated into all aspects of life. Artists are also beginning to use digital technology as a tool to represent the ideal artistic effect. While inheriting the traditional techniques of traditional watercolor painting, the watercolor painter should abandon the creative attitude of self-respect and self-reward, extract the vivid visual feeling from the aesthetic trend of the new era, trigger the interaction of the audience in the new era, and inspire the audience to think and discover. Go to comprehend.

Of course, a new generation of artists, in addition to mastering the application of digital technology, must also strengthen the study of the traditional watercolor painting theory system, learn and inherit the precious artistic heritage left by the predecessors, and let traditional watercolors evolve into new art in the use of digital technology. The work that modern watercolor painters need to do is to explore more new forms of watercolor art that meet the needs of the times. I believe that in the future, due to the involvement of digital technology, watercolor painting will have more artistic features and fully express our social life.

4.3   Digital Technology Expands the Theme of Watercolor Painting

The diversified development of today's society also affects the progress of watercolor painting to multi-integration. When human science and technology achieve a staged breakthrough, it will inevitably lead to the development of art. Watercolor painting has always been well known to the public for its fresh and beautiful, indifferent natural artistic charm. Traditional watercolor painters will not use commercial and rich works such as posters and commercial illustrations as the creative material of watercolor painting. Through the author's attempt, the watercolor painting can be found in this performance. The class object produces a different visual experience in the past. This commercial picture and the water-based language of digital photos and watercolors create a new visual experience and acquire another unique charm.

The digital software technology represented by Photoshop has opened up a new field of watercolor creation objects. The copy language in digital technology weakens the intervention of

human emotions in traditional painting, making the language of digital imaging technology more prominent. This is the author's intention to remove artificial emotions. Through the integration of digital software technology language, the author's watercolor paintings present a kind of fresh and transparent, rigid mechanical features, which replaces the author's conventional emotional expression means, highlighting the whole hidden behind digital software technology, the social age and the change of visual thinking, this is the visual beauty and novel picture effect of today's image era. It also expands the traditional watercolor painting theme, such as posters, network symbols, and commercial star portraits. The range of themes of creation, the drawing of these themes also shines a new era of watercolor language.

5 CONCLUSIONS

The author has been in this area to explore its various uses, and want to be linked with basic art education. Understand that university computer art courses are mostly software learning or simple computer painting, there are a lot of limitations and problems, and they want from this aspect in the form and content of innovation. The purpose of this paper is to probe into the application in the teaching of specific subjects, to expand the teaching significance of its software, to provide a better and more suitable teaching mode for the teaching of computer art in university, to improve the teaching method and to improve the teaching effect. In addition, it can improve the quality of teaching, and provide more teachers with some experience and theoretical reference.

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