




# The Intangible Inheritance of the Characteristics of the Mural Paintings in Mogao Grottoes, the Artistic Value of the Patterns and Their Influence on Art Education

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**Citation:** Zhao, Z. (2024). The Intangible Inheritance of the Characteristics of the Mural Paintings in Mogao Grottoes, the Artistic Value of the Patterns and Their Influence on Art Education. *Mediterranean Archaeology and Archaeometry*, 24(3), 175–190.

[10.5281/zenodo.13626844](https://doi.org/10.5281/zenodo.13626844)

## ARTICLE INFO

Received: 03 Apr 2024

Accepted: 10 May 2024

## ABSTRACT

In order to explore the pattern characteristics and artistic value of the murals in the Mogao Grottoes, this paper takes the murals of the Song Dynasty as the research object. CNKI, Wanfang and other documents were searched to collect the artistic connotation and educational value of the murals in the Mogao Grottoes in the Song Dynasty, and the pattern features, materials and pigments in the murals were observed with the help of high-definition microscopes. Then, with the help of a 3D scanner (Japan, Canon, JN400 type) and hardness tester (China, Guangdong, H2002 type) testing tools, observe the composition art of the patterns in the mural. The results show that the murals in Mogao Grottoes are rich in dyes, which are mainly composed of alumina, iron oxide, iron oxide, copper sulfate, aluminum hydroxide, etc., and form a metal oxide film on the surface of the murals to prolong the color retention time of the murals. The motifs in the mural are composed from the lower corner to the upper left corner, and the composition of the hollow space is similar to that of Western oil paintings. During the Song Dynasty (960~1279 AD), the murals of the Mogao Grottoes were similar to Western oil paintings in terms of dyes, composition and aesthetics, and also highlighted the culture of the Western Regions in the Song Dynasty, which was an important case of cultural exchanges between China and the West, and played an important role in promoting the establishment of the concept of modern art education and the enrichment of its content.

**Keywords:** Intangible Inheritance, Mogao Grottoes Murals, Pattern Design, Modern Education.

## INTRODUCTION

The murals of Mogao Grottoes have always been one of the treasure houses of ancient Chinese art, which originated in the pre-Qin period (366 AC), and then went through the continuous improvement of the Tang Dynasty (618~907 AC), the Song Dynasty (960~1279 AC) and the Ming Dynasty (1368~1644 AC). The murals of the Mogao Grottoes are part of the cultural heritage of China and the world, and their historical, artistic and cultural value is immeasurable. Based on this, this paper will conduct an in-depth study on the intangible inheritance of the pattern characteristics of the murals in the Mogao Grottoes, the design value of the pattern art and its influence on art education (Bi et al., 2021; Duan et al., 2021), so as to better protect and inherit the historical and cultural heritage value of the murals in the Mogao Grottoes. The murals of the Mogao Grottoes have far-reaching historical and cultural value. The theme content of the murals in Mogao Grottoes is Buddhism, Taoism, Islam and other religions, and it is mainly based on the content of ascending immortals, seeking Buddha, and parading the emperor, which can reflect the social outlook and political atmosphere and religious content of the time, and has great archaeological value (Cao et al., 2021; He et al., 2021). In the murals of Mogao Grottoes, such as "A Thousand Buddhas" and "Seeking Immortals", the mural techniques are wonderful and exquisite, and the colors are often very bright and bright. The murals of the Mogao Grottoes have the advantage of exquisite

composition, vividly showing social scenes, life scenes, religious beliefs, etc (Chai et al., 2022; Liu et al., 2023). It can be said that the murals of the Mogao Grottoes have a high artistic education value, for example, the cave murals show the history of cultural exchange and have witnessed the process of integration between China and the West. Therefore, the murals of the Mogao Grottoes have had a profound impact on later generations in terms of religion, philosophy and art. In addition, there are many different patterns in the murals of the Mogao Grottoes, and the study of the intangible inheritance of the characteristics of the motifs will be conducive to the further understanding of the mural art of the Mogao Grottoes in later generations, and improve the archaeological excavation level of the murals of the Mogao Grottoes (Han et al., 2022; Liu et al., 2022). To this end, this paper analyzes the artistic value of the murals in the Mogao Grottoes from the perspective of intangible inheritance, pattern art design value and its influence on art education. First of all, this paper analyzes the historical and cultural heritage, the results of the integration of multiple cultures, the inheritance value of the murals, and the artistic status of the murals through the study of the intangible inheritance of the pattern characteristics and the design value of the pattern art in the Mogao Grottoes. Secondly, the pattern characteristics of the murals in the Mogao Grottoes were analyzed to find out their role in modern art education, the aesthetic and creative effects of the murals, and the innovative thinking and artistic exploration interest of the murals. Combined with the art development data of the Song Dynasty and the integration of China and the West, this paper analyzes the source of inspiration for the pattern characteristics of the murals in the Mogao Grottoes, and finds out its role in modern art education and the inheritance of traditional culture, which has certain research significance.

## METHODOLOGY

### Research Methodology

Through the Internet network, the relevant literature of CNKI and Wanfangzhong was retrieved, and the preliminary literature was classified and summarized according to the theme, artistic connotation and educational value of the Mogao Grottoes in the Song Dynasty (960~1279 AD). Then, a 0.2:1 replica of the Dunhuang murals was purchased, and the shape and spatial structure of the murals were measured. Search for relevant information, obtain the dye characteristics of Dunhuang murals, and use 3D scanners (Japan, Canon, JN400 model) and hardness tester (China, Guangdong, H2002 model) to observe the material of the murals, as well as carving traces, and analyze the artistic value of the murals. Then, with the help of a thin film mechanical test tool (3 kg measuring range, Dongguan, Guangdong), the center of gravity of the pattern components in the mural was observed. Note: The patterns and graphics in the sample do not have copyright implications.

## RESULTS

### Materials of the Mural

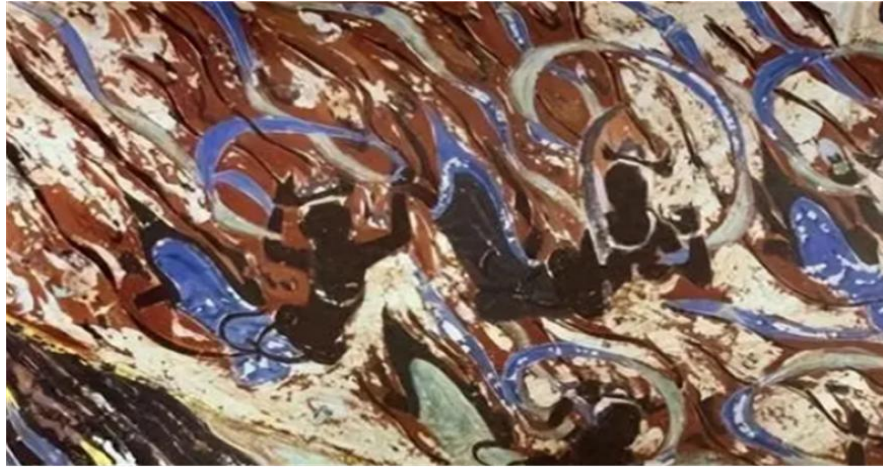
The colors and patterns of the murals in the Mogao Grottoes were compared, and the specific results are shown in Table 1.

Table 1. Comparison of Color Dyes in the Murals of Mogao Grottoes in the Song Dynasty

Color	Dye	Main Ingredients	Surface Oxide	Fits the Theme
Red	Cinnabar, silver vermilion, earth red	Ferric oxide, iron oxide	Iron oxides, aluminum oxides	Buddhism, taoism
Yellow	Native yellow, realgar, orpiment, as well as shells and powder	Alumina, lead oxide	Alumina	Buddhism
Blue	Stone blue, stone green and cyanine	Copper sulfate, aluminum hydroxide	Alumina	Figures, immortals, decorations
White	Alabaster, white powder and shell ash	Calcium carbonate	Calcium oxide	Buddhism, taoism
Black	Ash oil, ink	Carbon	Not	Buddhism, taoism

From the contents of Table 1, it can be seen that the murals in the Mogao Grottoes are diverse in color, and there are many themes on display, involving religions such as Buddhism and Taoism, as well as themes such as seeking immortals and asking for divination, as well as major ceremonial and pilgrimage activities such as the emperor's travels. The patterns of the murals in the Mogao Grottoes are deeply integrated with traditional Chinese

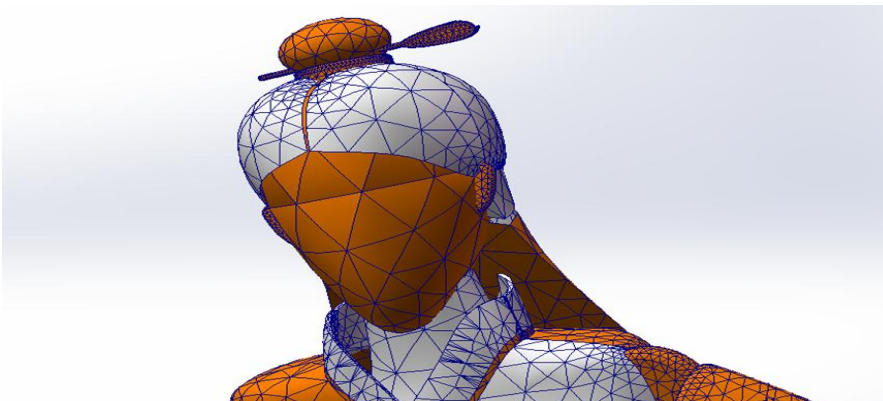
murals, Buddhist art, and cultural elements of the Western Regions, especially the use of blue and yellow, all of which show a variety of expressions. For example, the patterns of many Mogao Grottoes murals use coloring, line drawing, perspective techniques, etc., and pursue a style full of artistic conception and unique color expression, as shown in Figure 1.



Flying



Maid



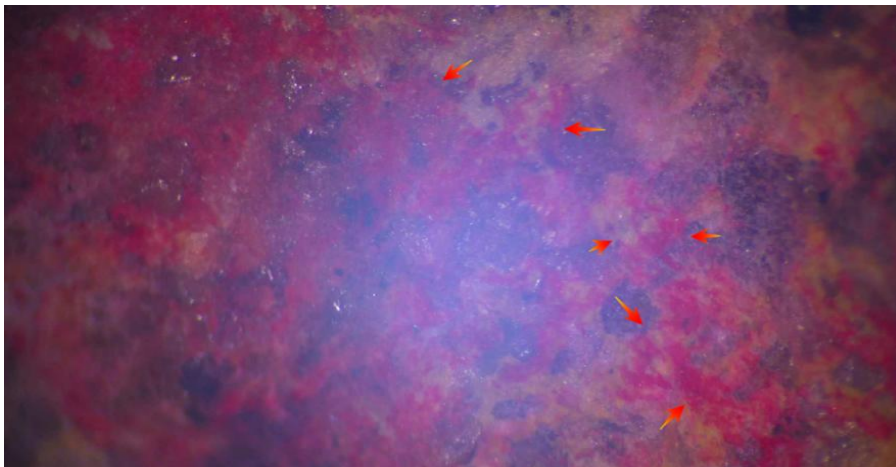
3D restoration of the handmaiden mural

Figure 1. Comparison of Colors

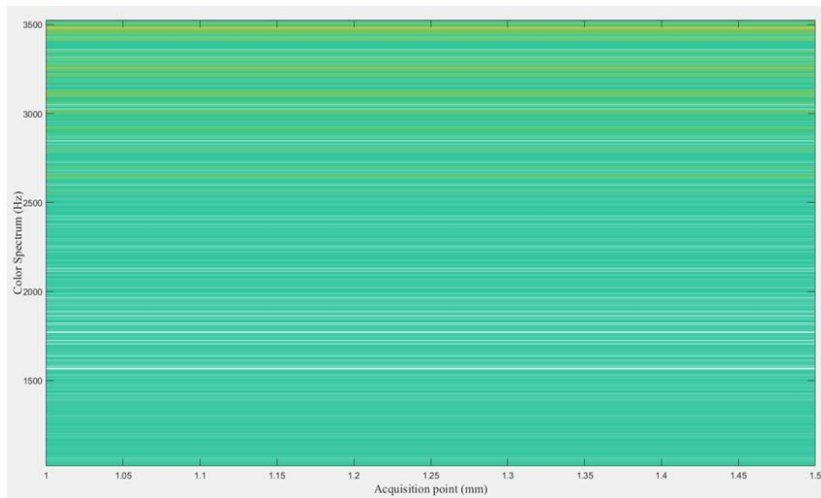
As can be seen from the content of the strokes in Figure 1, the murals of the Mogao Grottoes attach great importance to the strong contrast of colors, mainly influenced by Western sampling art to express a cultural



artistic conception. The Song Dynasty (960~1279 AC) was one of the nodes of Buddhist cultural transmission, and its patterns basically integrated some Buddhist elements, such as the images of religious figures such as Buddha and Bodhisattva, and related religious storylines, which can reflect that the mural patterns of the Mogao Grottoes are obviously influenced by Buddhist art, and are specifically expressed in form and content. The study of the pattern characteristics of the murals in Mogao Grottoes has certain commercial value. First of all, uniqueness and recognition. The mural patterns in the Mogao Grottoes have unique stylistic characteristics and are highly recognizable. This makes the Mogao Grottoes mural patterns a popular and sought-after element in the art market, so the Mogao Grottoes mural patterns provide many visual identity creative inspirations for commercial products and brand design. Secondly, cultural values (Hao et al., 2022; Mu et al., 2023). The mural patterns of the Mogao Grottoes not only have artistic value, but also carry extremely profound historical and cultural value. The mural patterns of Mogao Grottoes can be applied to commercial activities, thus conveying rich historical and cultural connotations and improving the cultural level of products and services (Li et al., 2021; Shui et al., 2022). Third, there is the potential for cross-border cooperation. The patterns of the Mogao Grottoes murals can exert a strong potential for cross-border cooperation, and combine them with modern design, fashion, home furnishing and other fields, so as to create new, unique and distinctive commercial products. Also, branding and marketing (Lian et al., 2023; Xu et al., 2023). Enterprises can build their brand image through Mogao Grottoes' mural patterns and then use this to do a good job in marketing and promotion, attract attention, and improve their brand influence. Finally, the creative industries promote. The motifs of the Mogao Grottoes can promote the development of creative industries and provide a variety of inspiration for the design of modern pattern designers, and at the same time, promote the joint development of enterprises in the related industry chain. Bright dyes such as blue, cyan and red mainly come from Afghanistan, Egypt and other countries, indicating the fusion of the murals of the Mogao Grottoes in the Song Dynasty and the cultural elements of the Western Regions (Liu, 2021; Yao et al., 2024). Because of its geographical location, the design of the murals in the Mogao Grottoes was clearly influenced by the cultural elements of the Western Regions on the Silk Road, so many bright colors were also used for contrast. In addition, the murals of the Mogao Caves in Cave 338 and Cave 340 not only contain a lot of pattern design content of the Song Dynasty, but also contain a lot of pattern styles and symbols from India and Persia, so these elements together constitute a relatively diverse and unique art, as shown in [Figure 2](#).



Red dye in the mural



The location of the spectrum of iron oxide

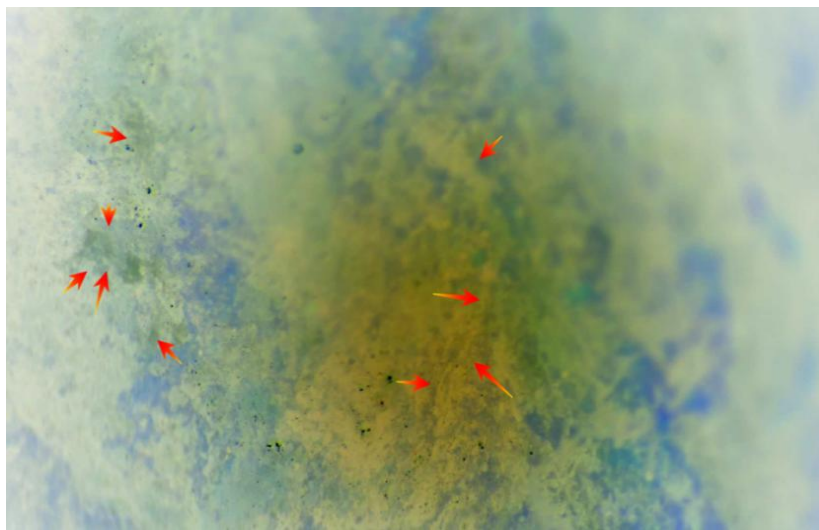
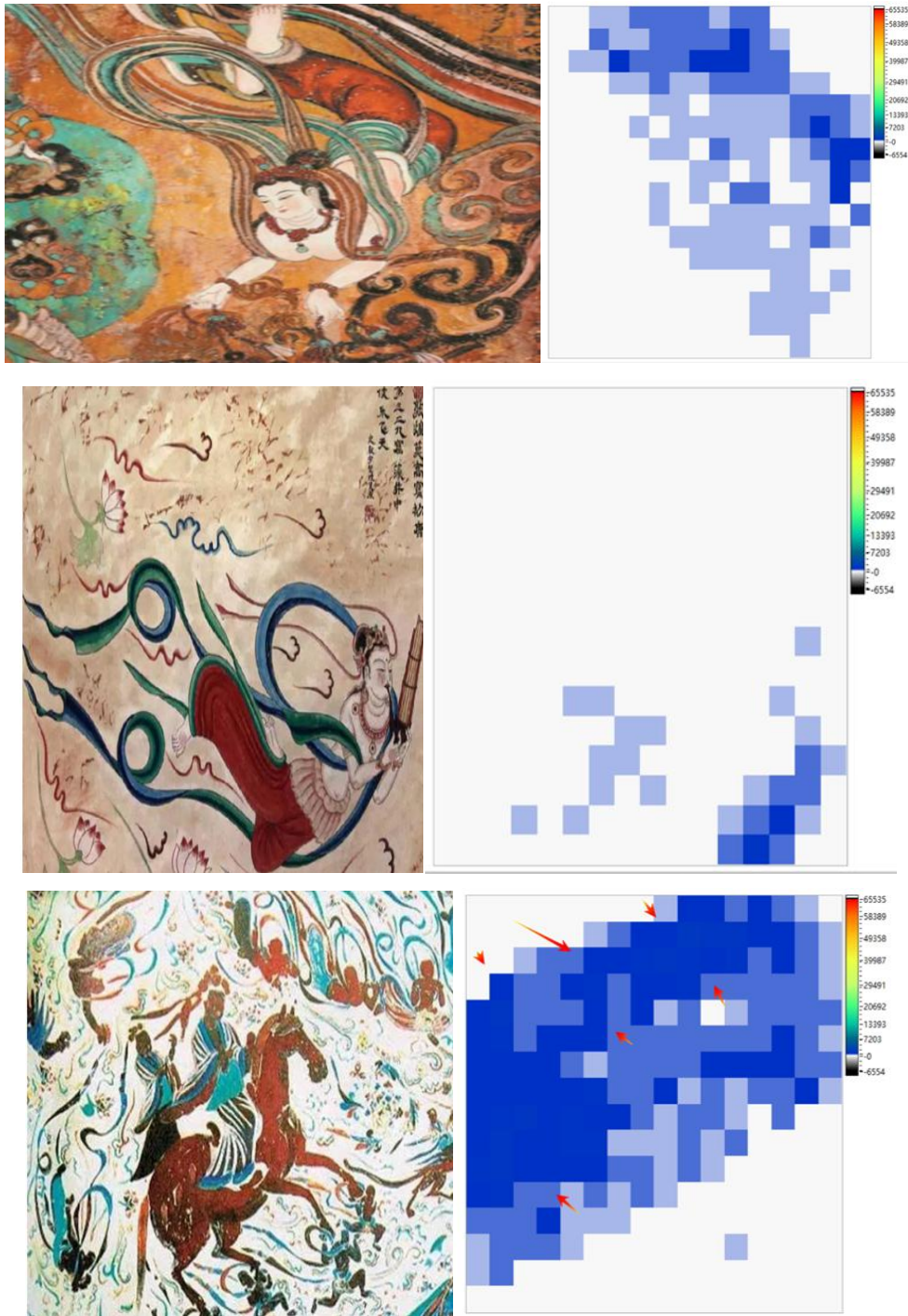


Figure 2. The Composition of the Dye in the Mural

The microscopic observation in Figure 2 shows that the mural has turned red, but by looking at it in reverse, it is found that the mural contains a large amount of particulate matter, and it is preliminarily concluded that it is iron oxide. During the Song Dynasty, inorganic compound dyes such as iron oxide were mainly produced in Persia, Afghanistan and other regions, proving that the types of dyes in the murals of Mogao Grottoes were composite dyes, which were a fusion of Chinese and Western dye colors. Iron oxide can enhance the mural's colour and improve the surface's oxidation resistance, making the color more durable (Liu et al., 2022; Yin et al., 2022).

### Spatial Structure of the Mural

Comparing the spatial structure of the Dunhuang murals, we can find the artistic style and value of the murals in the Mogao Grottoes, as shown in Figure 3.



The Dynamics of Different Murals Varies

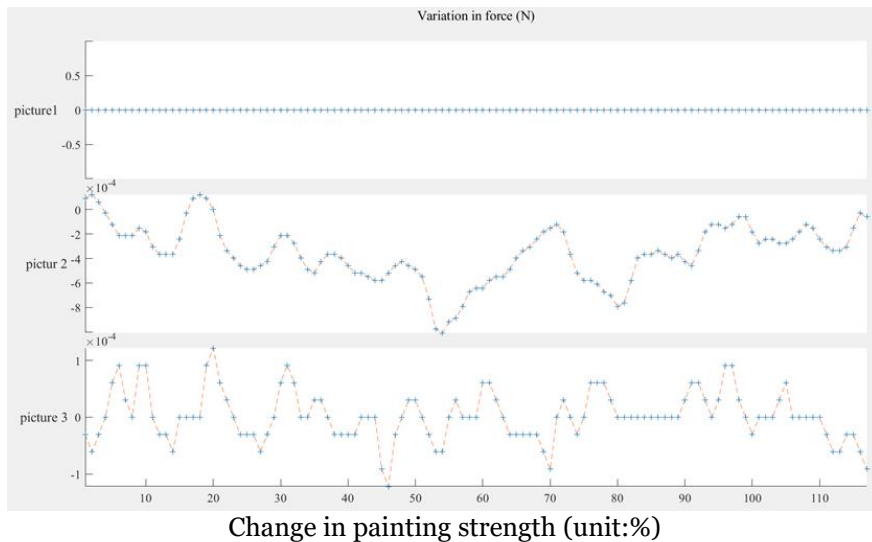
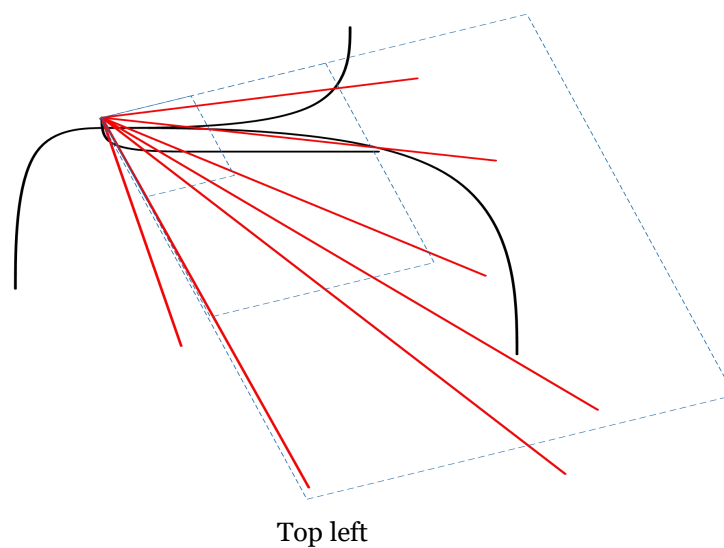
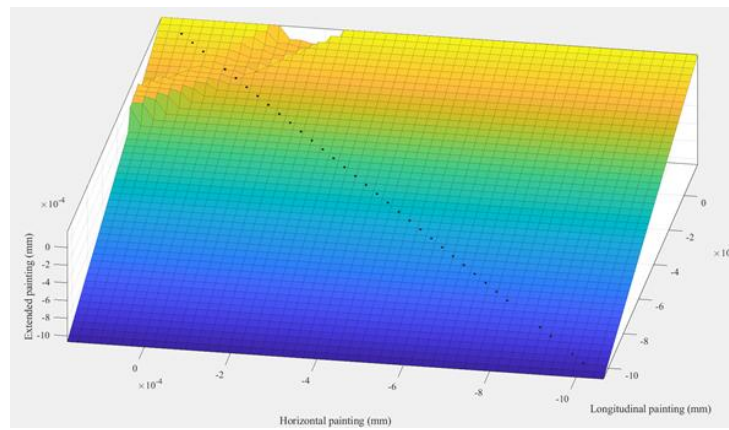


Figure 3. Structure of the Murals in the Mogao Grottoes

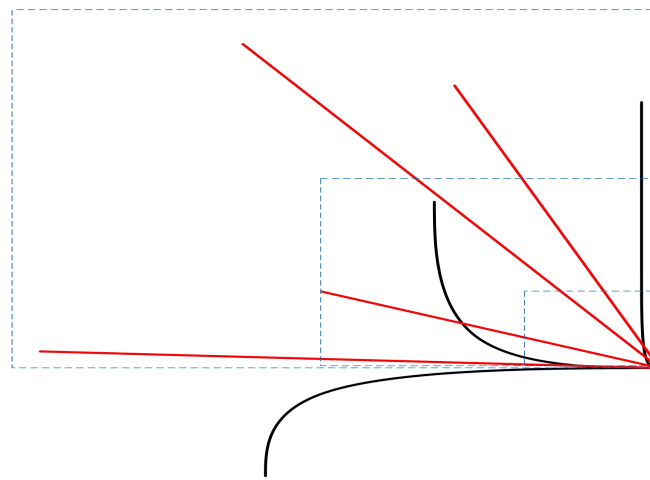
In Figure 3, the strength test of the murals of the Mogao Grottoes in the Song Dynasty shows that the structure of the murals is mainly biased to the upper left and lower right, or the overall central axis is biased to the left. This kind of painting can make the characters and shapes more vivid, which belongs to the Western oil painting method. However, the content in the mural has the characteristics of Chinese landscape painting and figure painting, which is the result of the fusion of Chinese and Western paintings. The murals' patterns in the Mogao Grottoes are beautiful and generous, but also convey a lot of value content through the composition structure of the murals in the Song Dynasty, including religion, history, and cultural information. The composition bias towards the upper left and lower right makes the mural beautiful and elegant. Against the backdrop of extremely rich colors and exquisite mural techniques, the variety of painting structures can bring a high degree of visual enjoyment to the viewer, make people feel more pleasant, and can highlight the decorative nature. In the Song Dynasty (960~1279 AC), the mural structure could also convey cultural and religious information, the upper left is to seek immortals, and the lower right is to ascend to immortals, so the mural patterns of Mogao Grottoes can convey many different religious, historical and cultural information. In addition, the complex mural structure can enhance the three-dimensional sense of the mural and has the practical application value of hollowing. The mural pattern of Mogao Grottoes not only has color and appreciation value, but also plays a practical role through the drawing of the structure, making the mural more three-dimensional, as shown in Figure 4.



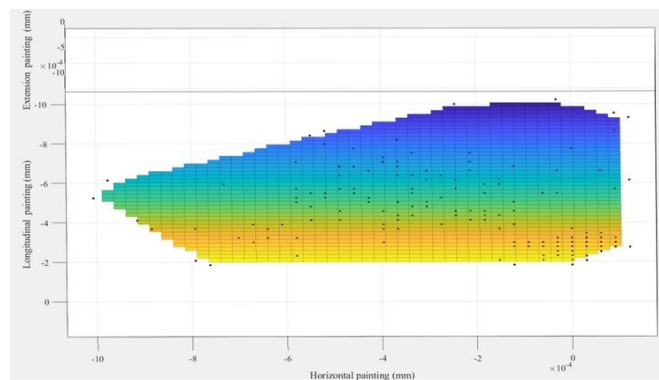




Distribution of spatial structure



Bottom right



Distribution of spatial structure

Figure 4. Three-dimensional Structure of Space

Through the content in Figure 4, you can know the overall hollow structure of the mural of Mogao Grottoes, giving people a three-dimensional sense, more vivid display of the mural content, the hollow three-dimensional structure can not only show the effect of flying and seeking immortals, but also increase the vividness of the mural. At present, the patterns of the murals in the Mogao Grottoes have gorgeous colors, smooth lines, vivid shapes, and hollow structures that can display high artistic space value, thus bringing a strong visual experience and sensory enjoyment to the audience, and a profound aesthetic experience. The colorful colors and hollow structure make the pattern design of the Mogao Grottoes murals very beautiful, and its color use is very rich, which can show diverse and gorgeous visual effects, so that the audience can feel the extraordinary beauty and have a very pleasant aesthetic experience. Secondly, the result of smooth and vivid lines and hollowing out makes the patterns of the murals in Mogao Grottoes not only have smooth lines, but also have a great sense of rhythm, which can outline the form with vitality and dynamics, so that the audience can have a harmonious viewing experience. Based on the use of color and effective line outlining methods, although the mural patterns of the Mogao Grottoes



can convey different themes and emotions, and then show a variety of visual effects to express the different emotions of the characters, they cannot show the vividness of comparison, so it is necessary to use the spatial structure to display the content of the murals. From the above analysis, it can be understood that the murals of Mogao Grottoes are affected by the intensity of painting, color matching, and spatial structure, so it is necessary to find out the overall color structure and changes of the murals, as shown in Table 1.

**Table 2.** The overall distribution of color, intensity and spatial structure of the murals in Mogao Grottoes

Name	Match (mean ± standard deviation)		Differences	t	p
	Transverse	Longitudinal			
Dark Pair Light	2.30±0.71	2.65±1.37	-0.35	-0.713	0.496
Up and down paired left and right	1.31±0.90	2.70±1.59	-1.38	-2.126	0.066
Deep seal carving paired with shallow seal carving	192.30±0.71	2.81±1.27	189.49	396.211	0.000**
Light Strength Paired Heavy Strength	1.00±0.01	2.66±1.60	-1.66	-3.117	0.014*

\* p<0.05 \*\* p<0.01

It can be seen from Table 1 that there are significant differences in the strength and seal carving of the murals in the Mogao Grottoes, but there is no significant difference in color and structure, mainly because the Mogao Grottoes are mainly based on Buddhism, the color is mainly dark, highlighting the solemnity, and the lack of difference in structure is to highlight the characteristics of Buddhist characters and avoid the influence of spatial structure on the shape of the figures. At the same time, the influence of spatial structure and color is analyzed, as shown in Table 2.

**Table 3.** The Overall Influence of Color and Structure on the Murals of Mogao Grottoes

Index	The Degree of Influence M (P25, P75)				p
	Cconnotation (n=1).	Characters (n=4).	Subject (n=2).	Overall layout (n=2).	
Color	1.667 (1.7,1.7)	2.968 (2.7,3.1)	1.316 (1.3,1.4)	2.371 (2.2,2.5)	0.066
Structure	2.814 (2.8,2.8)	0.799 (0.5,1.1)	2.296 (2.3,2.3)	0.639 (0.6,0.7)	0.112
Sculpt	191.667 (191.7,191.7)	192.969 (192.7,193.1)	191.315 (191.3,191.4)	192.371 (192.2,192.5)	0.066
Material	1.016 (1.0,1.0)	0.997 (1.0,1.0)	1.009 (1.0,1.0)	0.996 (1.0,1.0)	0.115
Synthesis	0.869 (0.9,0.9)	2.481 (1.7,3.4)	2.406 (1.0,3.8)	4.030 (3.1,5.0)	0.280
Personalize	3.717 (3.7,3.7)	2.432 (0.6,4.1)	1.529 (0.8,2.3)	3.983 (3.4,4.6)	0.513

From the calculations in Table 3, it can be seen that the influence of features and overall layout is the greatest, and the influence of structure, personality and color of the mural is more obvious, while the influence of materials is relatively small. Mainly, the materials used in the murals of Mogao Grottoes were commonly used at that time, and no special materials were used, so they had little impact on the murals. Among them, the colors are to highlight the solemnity of the Buddhist figures, as well as the individuality of the theme. The structure is to show the vividness of the figures, so color and structure are the main directions of archaeological research, and relevant materials only need to collect archaeological documents for comparison.

The use of color and hollow structure allows the Mogao Grottoes murals to highlight the theme and convey a variety of different emotions and atmospheres, such as solemnity, mystery and festivity. Secondly, the line outline. The lines of the Mogao Grottoes mural pattern are very smooth and vivid, which can be used to outline various images and scenes, and the hollow structure improves the visual impact of the work and the sense of dynamic experience (Liu et al., 2023; Zhang et al., 2022). The hollow structure makes the visual effect and emotional expression more abundant, and the murals of the Mogao Grottoes create a lot of layered visual effects through a variety of meticulous depictions and careful compositions, combined with the layout, based on which the connotation and emotion can be expressed with a deep sense and richness. Modern visual art can draw inspiration from the murals of the Mogao Grottoes (Ma et al., 2023; Zhang et al., 2022). The murals of the Mogao Grottoes have a variety of pattern characteristics, such as unique lines, diverse colors, and symbolic characteristics.

All of this has given modern visual artists a lot of inspiration, which has led to new breakthroughs in their creations. Modern pattern designers can draw on the traditional pattern characteristics in the murals of the Mogao Grottoes to create different visual works, so as to combine traditional aesthetics and modern graphic art design concepts. Second, applications in fashion and product design. The murals of the Mogao Grottoes have been widely used in modern fashion and product design. For example, modern clothing and jewelry design, furniture decoration, etc., all have many characteristics of the Mogao Grottoes murals. The application of these characteristic elements not only promotes the continuous popularity and dissemination of traditional Chinese culture, but also improves the cultural value of commodities and their artistic taste. Third, cultural identity and brand building. Using the pattern characteristics of the Mogao Grottoes murals to carry out brand building can enhance the sense of cultural identity. Enterprises or institutions can use these patterns to integrate into their own brand image design, and based on this, they can showcase, protect and inherit traditional Chinese culture, and at the same time, enhance their own brand cultural connotation and brand value (Ma et al., 2023; Sun et al., 2022). Cross-border art cooperation and exhibitions. The motifs of the Mogao Grottoes can promote the continuous development of cross-border art cooperation projects and exhibition activities. Chinese and foreign museums, art galleries and art institutions can often hold exhibitions on the theme of Mogao Grottoes, so that they can be combined with modern art forms, show the beauty of traditional patterns, and enhance the public's awareness of the protection of traditional cultural heritage.

## DISCUSSION

### The Influence of Mogao Grottoes Murals on Art Education

#### Profound Cultural Connotation Cultivates Creative Ability

The murals of the Mogao Grottoes in the Song Dynasty have a variety of motifs, such as different geometric figures and natural elements, religion, and mythological stories. The introduction of the motifs in murals of the Song Dynasty into aesthetic education will broaden students' artistic horizons and provide them with artistic aesthetic experience from various cultural backgrounds. The mural patterns of the Mogao Grottoes in the Song Dynasty can reflect high value in artistic innovation and change. For example, "Flying Heaven" and "Seeking Immortals" can provide a lot of inspiration for the creation of modern art and promote the continuous development and evolution of artistic expression. The mural patterns of Cave 338 and Cave 304 in Mogao Grottoes have a unique style and rich and colorful content, which provide a lot of inspiration for modern graphic art education and are their source of inspiration. Modern works of art have been inspired by the motifs of the Mogao Grottoes, such as in composition and theme. The cross-cultural integration of Buddhist murals in Cave 283 is the product of different cultural exchanges and integration, so in essence, the existence of the pattern characteristics of the murals in Mogao Caves is to encourage modern artists to boldly explore their own creative methods, which to a certain extent promotes the continuous transformation and development of modern artistic expressions. Finally, technological and material innovations. With the continuous emergence of new materials and new technologies, many traditional patterns and painting techniques in the murals of Mogao Grottoes have been interpreted and applied more in modern graphic art, which has a certain role in promoting the continuous innovation of artistic expression. At present, the study of the murals of the Mogao Grottoes is digitally analyzed to protect the color of the Dunhuang murals better. The physical protection of the murals in the Mogao Grottoes is very strict and effective, including controlling the number of visitors and limiting the time of light to reduce the damage to the murals of the Mogao Grottoes (Song, 2023; Yin et al., 2021). In addition, a large number of staff have been working to effectively protect the environment where the Mogao Grottoes murals are located, and specific protection measures include vegetation restoration and soil and water conservation, so as to keep the environment of the Mogao Grottoes murals stable. For the damaged patterns in the murals of the Mogao Grottoes, it is necessary to carry out the necessary restoration work, such as taking professional technical measures or using relevant materials to complete partial repair and protection. The most important thing in the restoration work is to restore the original pattern features as clearly as possible and prevent the damage from aggravating. Cultivation of creative thinking. The characteristic patterns and color combinations in the murals of the Mogao Grottoes allow students to find a lot of unique creative materials. In their artistic practice, they can try to integrate elements of Mogao Grottoes' mural patterns into their creations and combine their creativity to develop innovative thinking. Secondly, cultural inheritance and understanding. Through the study and application of the pattern characteristics of the Mogao Grottoes murals, students can not only understand the classical Chinese art and culture (Yu et al., 2024), but also understand the lifestyles and ideas of the ancients in various historical stages, so as to deepen their recognition and understanding of the cultural heritage value of the Mogao Grottoes murals. Finally, technical skills are upgraded. In the process of imitating, reinterpreting, and interpreting the murals of

the Mogao Grottoes, students are exposed to many mural techniques and materials. All these can help students carry out technical training and improve their artistic innovation and practical ability.

#### Integrate Traditional Cultural Connotations in Education

The effective introduction and application of the characteristics of the mural patterns of the Mogao Grottoes in art education can achieve certain value. Through the deepening and integration of cultural connotation, students' aesthetic literacy is improved. By learning and appreciating the pattern characteristics of the murals in the Mogao Grottoes, students can improve their aesthetic literacy and improve their understanding and awareness of various artistic styles and expressions. The content of the murals in the Mogao Grottoes is very rich, including various themes such as Buddhist stories, myths and legends, historical figures, etc., and has a lot of cultural content. The existence of the murals of the Mogao Grottoes has become a historical witness. When learning about the murals of the Mogao Grottoes, students can not only appreciate the exquisite artistic shapes and bright color matching skills, but also understand the historical stories behind these patterns to understand the living conditions, religious beliefs and aesthetic pursuits of the ancients. In short, these aesthetic experiences can greatly enrich students' aesthetic experience and improve their aesthetic perception ability. In the process of learning and appreciating the murals of the Mogao Grottoes and analyzing their pattern characteristics, students can get in touch with the early Song Dynasty (960~1050 AC), the middle (1050~1120 AC) and the late Song Dynasty (1120~1279 AC), as well as the pattern art and expressions of the regional styles of ancient Persia and Afghanistan. From the Northern Wei Dynasty to the Tang Dynasty, Song and Yuan dynasties, the patterns of the murals in the Mogao Grottoes have different styles, which can reflect the aesthetic exploration and understanding of artists in various periods. Through the analysis and summary of various styles and techniques, students can feel the richness and impact of the visual experience, and understand the charm of the works of the Mogao Grottoes murals at different stages. At the same time, learning and appreciating the pattern characteristics of the murals in the Mogao Grottoes can enable students to understand the aesthetic concepts of ancient artists in various periods, the social environment at that time, and the correlation between different cultural backgrounds. It also allows students to emotionally experience the charm of works of art from thousands of years ago. In this way, students can improve their aesthetic ability and critical thinking, through understanding the Tang Dynasty and Song Dynasty (960~1279 AC) culture to enhance their creative thinking. Stimulate students' innovative thinking. The unique and diverse pattern characteristics of the Mogao Grottoes murals can stimulate students' innovative thinking and encourage them to constantly try different expressions and creativity in their personal creations (Zhang et al., 2022). The patterns of the murals in the Mogao Grottoes are unique, and the basis for the formation of this uniqueness is that the motifs of the Mogao Grottoes often use different themes of multiple cultural systems and a variety of Chinese and foreign art techniques. Students can take some inspiration and try to combine traditional themes with modern elements to develop new and creative forms of artistic expression. Students can deepen their understanding and understanding of traditional Chinese culture and history by learning and appreciating the patterns of the Mogao Grottoes, and enhance their self-confidence in their own national culture and improve their sense of cultural identity. Based on this, students can deepen their understanding of the overall appearance of ancient Chinese society and traditional Chinese culture and religious beliefs by studying these Mogao Grottoes murals, enhancing their national cultural identity. Secondly, in the Mogao Grottoes mural patterns, there are many Buddhist motifs and social life patterns, historical legends and other patterns, these themes constitute the traditional cultural content of the Chinese nation, students can learn the Mogao Grottoes mural patterns, to know and understand the ancient Chinese society and religion, history, culture, etc., and in the process, feel the aesthetic pursuit and artistic expression of ancient Chinese artists. Based on this, it can also enhance their sense of identity with the Chinese nation's artistic tradition and improve their self-confidence.

#### Improve the Inheritance of Traditional Mural Techniques

The colors and techniques of the murals in the Mogao Grottoes are a combination of traditional Chinese murals, integrating the mural techniques from the Qin Dynasty to the Tang Dynasty, so they have a high inheritance value. When learning and appreciating the mural works of Mogao Grottoes, students can also learn how to improve the visual impact and aesthetic impact of their works when appreciating various artistic styles and techniques, so as to continuously explore and try different mural techniques, color application methods, composition methods, etc. Secondly, the patterns of the murals in the Mogao Grottoes have the characteristics of diversity. Students can experience different art spaces and improve their artistic imagination by learning and appreciating the murals of the Mogao Grottoes. Moreover, these Mogao Grottoes murals with different styles, themes, and expressions can also show students various artistic possibilities to stimulate students' tolerance in artistic creation and improve the diversity of their artistic creation. Based on the understanding and appreciation of the various patterns and forms of the murals in the Mogao Grottoes, students will also jump out of some traditional frameworks from their personal creations, and bravely try different forms of artistic expression to improve the artistry of their personal style. In the process of imitating the mural patterns of the Mogao Grottoes,

students can improve their artistic practice skills, such as observation, depiction, and composition skills. First of all, students will improve their observation skills and depiction skills. The lines of the Mogao Grottoes mural patterns are very fine, the colors are very rich, and the style is extremely unique, if students can deepen their observation of the Mogao Grottoes mural patterns, they can improve their personal artistic practice ability. For example, they can imitate the character shapes, costume textures, and scenery layouts in the Mogao Grottoes mural patterns, learn and exercise their ability to capture details, improve their hand coordination, and then interpret the original appearance of the pattern more accurately in the depiction. Secondly, imitating the mural patterns of the Mogao Grottoes can also improve the students' artistic perception ability, and teach them how to express unique light and shadow effects and create a three-dimensional sense through the clever use of lines and colors, which has a very positive impact on improving their mural skills. Then, it strengthens students' sense of composition and creative ability. Students can refer to and imitate the motifs of the Mogao Grottoes murals to develop their artistic creations, and in the process, they need to understand the storyline and cultural connotations behind the motifs. Based on this, students will develop an ability to understand composition, and learn to pay attention to the relevance of the overall layout and theme expression when composing, and then improve their personal creative skills, such as improving their ability to control various aspects of spatial distribution and visual intersection and visual flow in creation. In addition, in the combination of imitation and creation, students can also try to include some traditional elements for their own works to improve their personal comprehensive artistic practice ability and innovation ability. Red, blue, green and other dyes are digitally protected and disseminated, and some advanced technologies, such as digital scanning and 3D reconstruction technology, can be used to digitally record the patterns of Mogao Grottoes murals, and create digital archives with high-precision characteristics. The application of high-resolution scanning technology and 3D imaging technology can be used to digitally preserve the murals of the Mogao Grottoes effectively so that the original murals can be effectively preserved and remote research and analysis can be facilitated. Secondly, the literature is collated. It is necessary to systematically sort out the historical documents, academic papers and research reports related to the preparation of the murals of the Mogao Grottoes, and establish a systematic database for them, so as to provide rich and reliable reference information for the research of relevant personnel. Then there is the analysis of the pattern features. It is necessary to carry out a specific analysis of the pattern characteristics of the murals in the Mogao Grottoes, including the analysis of their pattern style, color, composition, lines, etc., and analyze the cultural meaning and artistic value behind these elements. Then, interdisciplinary collaboration. It is necessary to support and encourage cross-disciplinary cooperation among experts in various fields to promote the study and documentation of the pictorial characteristics of the murals in the Mogao Grottoes. Finally, public education and presentation. It is necessary to display various research results on the pattern characteristics of the murals in the Mogao Grottoes, so that the public can deepen their knowledge and understanding of the pattern characteristics of the murals in the Mogao Grottoes. At the same time, relevant personnel should also actively popularize the artistic knowledge of Mogao Grottoes murals through exhibitions and lectures, so as to improve the audience's awareness of the inheritance and protection of the cultural heritage of Mogao Grottoes. The simulation education content can not only reduce the impact of visiting the murals of the Mogao Grottoes, but also use the network platform to carry out relevant dissemination and teaching, and then improve the application value of precious cultural heritage. Colleges and universities should be able to support and encourage students to conduct in-depth research on the murals of the Mogao Grottoes, such as the study of the artistic style, historical background and techniques of the murals of the Mogao Grottoes, and understand the skills of hollow design and color design. In addition, all parties can also incorporate relevant content into university education and public education to raise awareness of the cultural and artistic value of the murals in the Mogao Grottoes, and stimulate the research interest and conservation awareness of the new generation in the precious heritage of the murals in the Mogao Grottoes. Through the identification of the carving traces in the murals, the traditional skills in the production of Mogao Grottoes murals can be excavated and revived, and the new generation can be trained to inherit the techniques and skills of the Mogao Grottoes murals by holding training classes or setting up special studios. Through certain practical operations, more people can master some ancient skills so as to ensure that the relevant knowledge of Mogao Grottoes' murals will not be gradually lost due to the passage of time.

#### Improve the Curriculum System of Modern Art Education

Obviously, the study of the pattern characteristics of the murals in the Mogao Grottoes can have an impact on the creation of modern graphic art. As one of the treasures of traditional Chinese art, the motifs of the Mogao Grottoes are a key component, and their effective introduction in the curriculum can enhance students' understanding of the Mogao Grottoes murals, enhance their cultural vision and their determination to preserve cultural heritage. For example, by allowing students to learn about the Buddhist stories in the murals of the Mogao Grottoes, they can understand the spread of Buddhism in ancient China and the profound influence of Buddhism on Chinese culture. For example, students can develop their aesthetic ability based on the study of



various artistic techniques such as the colors and lines of the mural patterns in the Mogao Grottoes. In addition, enhance cultural self-confidence. Understanding, recognizing, and mastering the essence of the nation's culture is the key to enhancing students' national self-confidence and pride. Integrating the characteristics of the mural patterns of the Mogao Grottoes into students' learning can stimulate students' sense of responsibility for the protection and inheritance of the cultural heritage of the Chinese nation. In this way, they can improve their ability to act and promote the protection, inheritance and promotion of the cultural heritage of the Chinese nation. As we all know, the Mogao Grottoes' mural patterns cover a wide range of fields, such as art, religion, and history. The introduction of the teaching of mural patterns in the Mogao Grottoes curriculum can increase the content of interdisciplinary learning and broaden students' artistic knowledge horizons and depth of knowledge in all aspects. For example, the fusion of art and history. The mural style and subject matter of the murals in the Mogao Grottoes carry a lot of historical information. By learning the characteristics of the Mogao Grottoes mural patterns and related techniques, students will learn to appreciate the Mogao Grottoes mural patterns, and understand the social, political, economic, and cultural changes and developments in various periods of ancient China, thereby broadening their understanding of history. For example, to explore religious cultures. The murals of the Mogao Grottoes contain many works related to Buddhist themes, which also incorporate many classic Buddhist stories and traditional Chinese elements. Students can deeply understand the role of Buddhist culture in the transmission and development of ancient China when interpreting the religious themes in the murals of the Mogao Grottoes and broaden their understanding of the diversity of religious cultures. In imitating the mural patterns of the Mogao Grottoes, students can improve their artistic practice and their personal innovation ability. Through the analysis and discussion of the characteristics and expressions of the Mogao Grottoes, they can cultivate their artistic aesthetic ability and creativity, as well as their interdisciplinary learning and practical ability. Introducing Mogao Grottoes mural patterns into the curriculum to carry out interdisciplinary learning can match the boundaries of various traditional disciplines, promote the mutual penetration of knowledge in various subjects, and cultivate students' comprehensive quality and innovation ability. In this way, students can enrich their knowledge system, and cultivate their innovative spirit and cross-border thinking ability. Through analyzing and studying the pattern characteristics of the murals in the Mogao Grottoes, teachers will innovate their own teaching methods, such as using case analysis methods or group discussions, to improve the interest and vividness of teaching, so as to attract students. For example, teachers can select a case study from the motifs of the Mogao Grottoes to conduct an in-depth analysis for students. Based on the students' understanding of the historical background of the pattern, the mural style, related techniques, and subject matter, students are guided to think seriously about the cultural and artistic connotations and related artistic skills behind the artworks. Based on this, students' creative associations can be stimulated and their ability to appreciate art can be cultivated.

## CONCLUSION

The murals of the Mogao Grottoes in the Song Dynasty are a combination of painting techniques from the Qin Dynasty to the Tang Dynasty and are the objective manifestation of cultural exchanges between China and the West. In the Song Dynasty (960~1279 AC), the murals of Mogao Grottoes were more abundant, not only with the theme of Buddhism and Taoism, but also with decorative murals. In terms of color, a large number of Western dyes are used, such as iron oxide, iron trioxide, alumina, aluminum hydroxide and copper sulfate and other inorganic dyes, which increase the color expression effect of the painting and enrich the content of the mural. In addition, the cultural connotation in the murals of the Mogao Grottoes in the Song Dynasty is richer, showing the desire of the rulers of the Song Dynasty to seek immortals, ask questions, and seek Buddha, as well as the people at that time to wear them. The composition of the mural is dominated by the upper left and lower right to enhance the vividness and three-dimensional sense of the figures in the mural, which is similar to the composition of Western oil paintings. The yellow and blue colors in the murals are used a lot, mainly because the themes of the murals are mainly Buddhism, Taoism and imperial travel. Therefore, it is said that the murals of the Song Dynasty are rich in content, cover a wide range, and have high humanistic, historical and artistic value, which has a role in promoting and enlightening modern art education. In addition, the emergence of digital technology and simulation technology has also played a role in promoting the protection and inheritance of the murals of Mogao Grottoes, indirectly improving the modern art education system and enriching the content of art education. There are also some research deficiencies in this paper, mainly because there are many contents of the murals in the Mogao Grottoes in the Song Dynasty, which is difficult to collect, and some of the data are incomplete. Further research will be carried out in the future to make up for the above shortcomings.

**ACKNOWLEDGEMENTS**

2023 China National Ministry of Education Supply and Demand Employment Education Project  
"Construction of School-enterprise Integration Training Mode of Animation Major in the Perspective of Practical  
Ability Training"

(Project number: 20230110275)

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