

A Novel Method for Language Expression of Watercolor Techniques in Digital
Animation Production Environment

Tian Xia

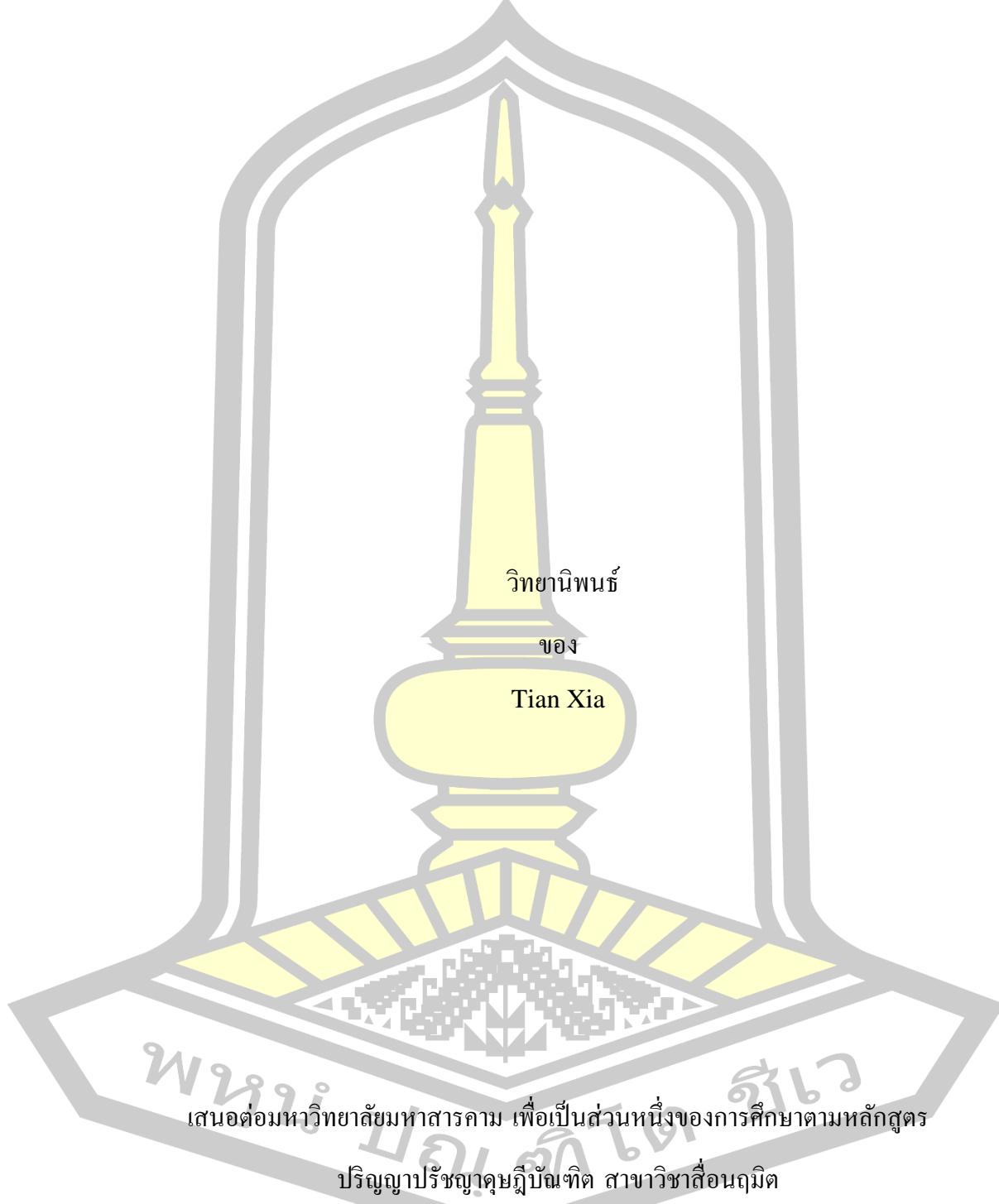
A Thesis Submitted in Partial Fulfillment of Requirements for
degree of Doctor of Philosophy in Creative Media

January 2025

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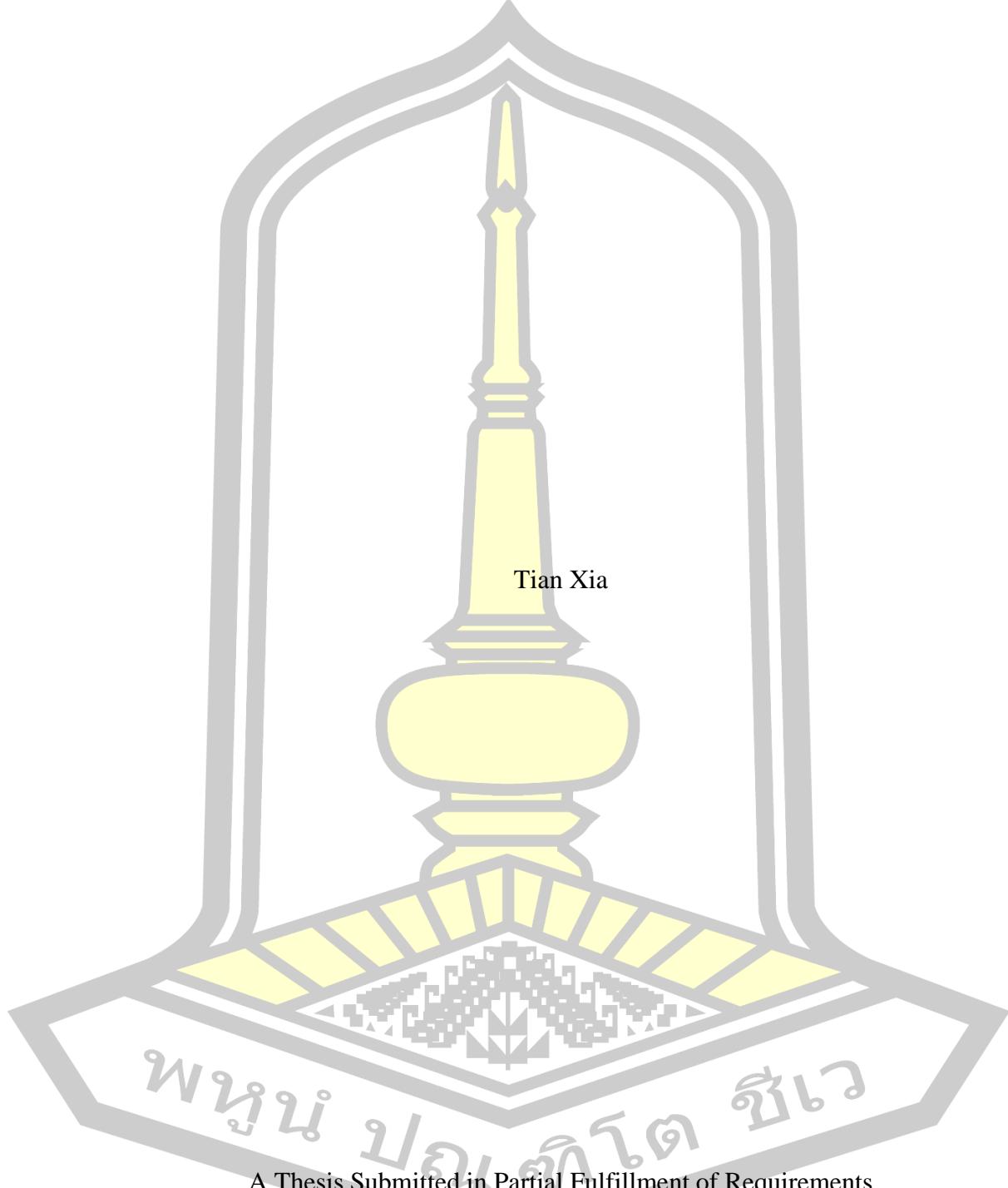


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ลิขสิทธิ์เป็นของมหาวิทยาลัยมหा�สารคาม

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Animation Production Environment



A Thesis Submitted in Partial Fulfillment of Requirements
for Doctor of Philosophy (Creative Media)

January 2025

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ABSTRACT

In the context of media convergence, this study integrates traditional watercolor techniques with digital animation to overcome the technical barriers that hinder the dissemination of traditional art through new media. This approach not only enhances the expressive capacity of watercolor as a technical language but also enriches the artistic essence of digital animation. The study employs a mixed-methods approach, combining literature reviews, case studies, expert interviews, and audience surveys to evaluate public acceptance and preferences regarding digital animation. The research is conducted in three phases. The first phase involves case studies and in-depth expert interviews to explore the potential of watercolor art in digital animation. The second phase focuses on identifying effective methods to merge watercolor techniques with animation production. In the third phase, the expressive quality of animated films produced using the proposed methods is assessed, and feedback is collected from 35 Chinese students and 47 Thai students.

This research explored that: (1) Watercolor animation combines traditional techniques with modern technology, enhancing storytelling through fluidity, texture, and color theory. It integrates artistic expression with innovative digital tools to create unique visual and emotional effects. (2) The "Digital Watercolor Animation" model fuses watercolor art with digital technology across scriptwriting, art design, and performance, blending creativity, technology, and audience engagement. (3) The "Digital Watercolor Animation" model performed excellently in emotional expression and storytelling, receiving high audience satisfaction. Expert feedback highly praised its application in the animated short film samples, recognizing its cultural depth, fluidity, and immersive visual effects. The findings confirm the potential of this model to expand creativity, blending artistic tradition with innovations in digital animation technology.

Keyword : watercolor art, digital animation, traditional art expression, media fusion

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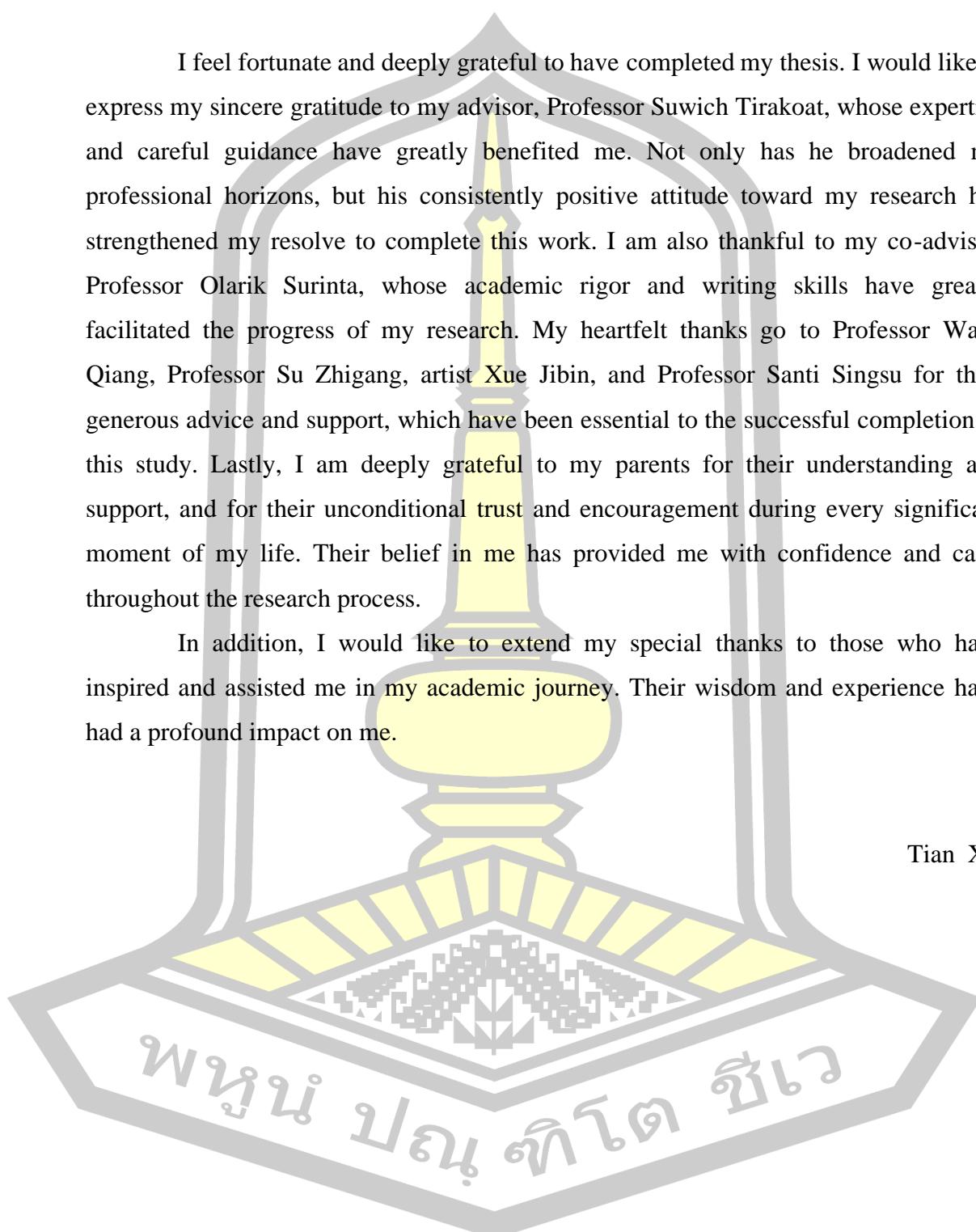


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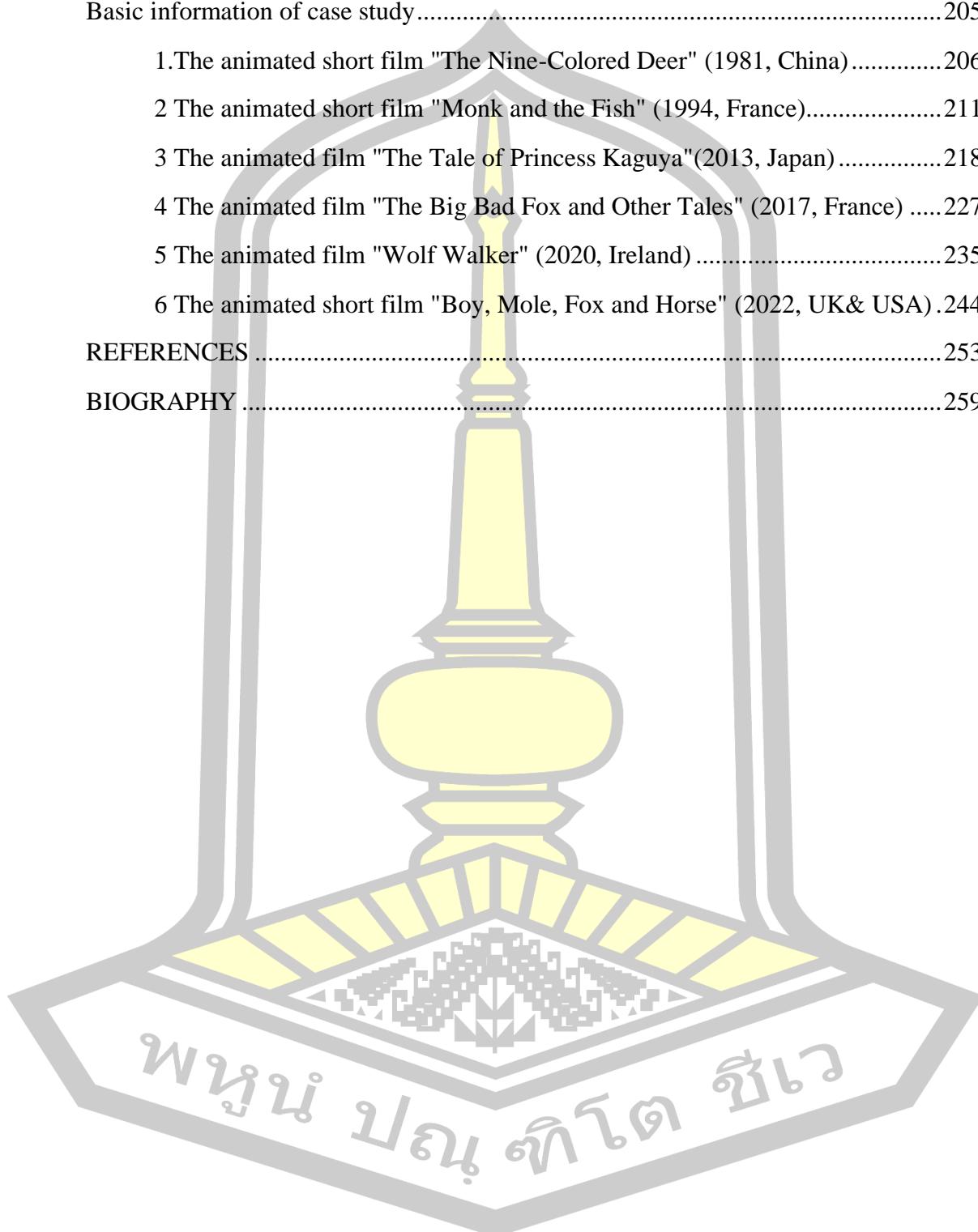
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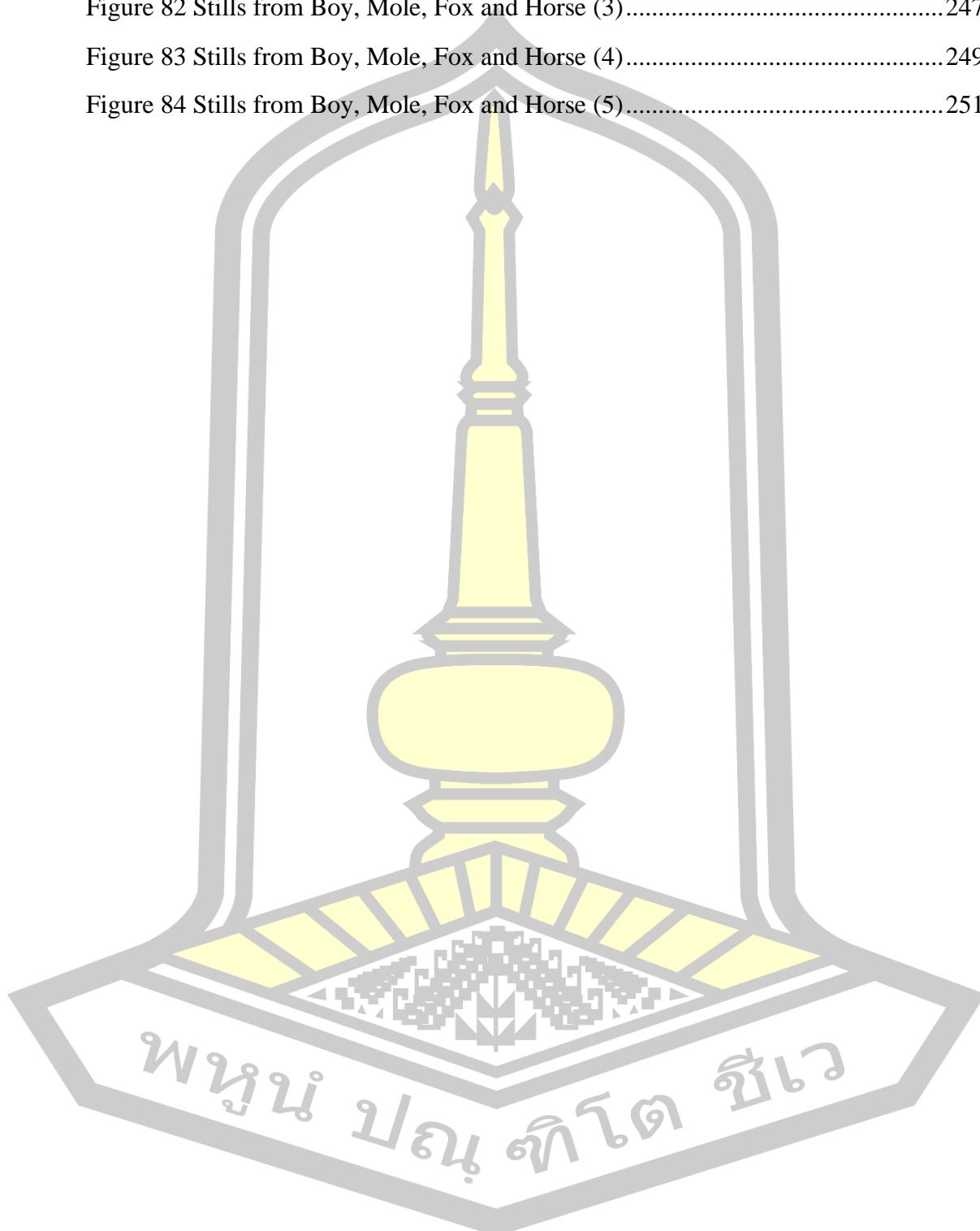
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Chapter 1 Introduction

1.1 Background of the study

The existence of watercolor language possesses independent aesthetic value. Through a historical study of painting and animation art, the significant role of watercolor in mastering color principles and image expression becomes evident. The fusion of conceptual "form" and expressive "mood" in thinking allows us to examine the interaction between form and expression from the perspective of art philosophy. However, in the age of information, the development of science and technology provides designers with more auxiliary tools for design, yet many designers excessively rely on computer operations, neglecting traditional hand-drawing methods.

Therefore, re-evaluating the value of hand-drawing in the era of computer graphics, repositioning the independent status of painting language in design expression, is undoubtedly a proposition that contemporary designers should deeply contemplate. Additionally, the information age demands artists to leverage the convenience of internet information dissemination, understand the primary spiritual needs of people in the current market environment, and create watercolor paintings that resonate with the thoughts of the new era. Utilizing internet digital platforms for dissemination becomes essential. This poses a significant challenge for traditional watercolor art, as the language of watercolor needs to express more artistic depth in mediums that better align with contemporary dissemination demands.

Animation art embodies typical characteristics of the new era. Animation is a dynamic and interdisciplinary field with extensive practical applications and profound research value in many societal domains. Dynamic elements and immersive multi-dimensional interaction are vigorously reshaping the core and shell of visual art. Guided by concepts like "cross-media fusion" and "immersive interactive experience," the emerging field of "pan-animation" and the quietly rising hyperspace art have become new subjects and future directions in the animation domain. Animation has found widespread application in various aspects of social life, contributing to the reconstruction of future language systems.

However, with the phenomenon of large-scale animation creation by the current generation, many designers tend to overlook traditional hand-drawing due to excessive reliance on computer operations. Hence, re-evaluating the value of expressive brushwork in the era of computer graphics, repositioning the independent status of painting language in design expression, is undoubtedly a subject worthy of contemporary designers' reflection.

The development of fast fashion has led modern watercolor language to focus more on concise and clear thinking, delving into design concepts that transcend the constraints of time, space, and geography. This context presents challenges for the application of watercolor language expression in the animation environment. Maintaining consistency and stability becomes more difficult, as animation production typically requires visual effects and details to remain consistent for overall coherence. However, the free-flowing and uncontrollable nature of watercolor art may lead to variations between different images, affecting the overall consistency and stability of the animation.

Another challenge is ensuring animation smoothness. Watercolor art often features gentle brushstrokes and transition effects, making it well-suited for static art. Achieving smooth movement and transitions in animation may require additional technical methods and time to adjust and draw each frame, ensuring a seamless and consistent animation. In the application of digital and post-production technologies, traditional watercolor art is typically done on paper, while animation production requires digitization and post-processing. Special scanning techniques and post-production software may be needed to handle, edit, and adjust images. Simultaneously, preserving the unique texture and quality of watercolor art and ensuring that digitized animations retain the original features of watercolor paintings present additional challenges.

The integration of these two mediums brings forth new problems beyond those mentioned above. Therefore, in the post-digital era, it is necessary to explore new avenues to overcome these creative bottlenecks, allowing both watercolor language and animation production to expand further development space.

The author's undergraduate and master's studies were both in the field of animation, so in the initial stages of topic selection, there was a plan to choose a research direction related to animation. Through preliminary investigation and research, it was discovered that watercolor art possesses significant aesthetic value in Eastern aesthetics. Subsequently, after reviewing the literature, it was found that the academic community's research and organization of watercolor art are insufficient, resulting in a lack of comprehensive historical research and systematic exhibition activities, leading to a failure to establish a sustained impact.

Simultaneously, considering the content of the studied discipline and industry information, it was observed that the digital animation environment is undergoing changes. Changes in audience aesthetics, the emergence of new communication media, and the intervention of new digital technologies have given digital animation production new meanings. Traditional methods of lionizing digital animation are

facing significant challenges in terms of cultural depth, expression, and production efficiency.

Therefore, this research attempts to explore the evolution of watercolor language expression in the digital animation production environment, seeking to find a novel method for language expression of watercolor techniques in digital animation production environment.

1.2 Research problems or questions

- (1) How to show more meanings that watercolor language can express through the animation medium.
- (2) How to find a new animation production method with the help of watercolor language expression ability.
- (3) In the background of fusion media, how to reflect the advantages of the combination of watercolor language and digital animation.

1.3 Research objectives

- (1) To re-examine and analyze the expression of watercolor language from the perspective of animation production.
- (2) To propose the new methods for communication of watercolor language expression in digital animation production environment.
- (3) To create and evaluate a sample animated short film based on the novel methods presented in this research, show the effect of expressing watercolor language technology in digital animation production environment.

1.4 Research scopes and limitations

1.4.1 The population target and participants

This research atmosphere has three research phases:

In the phase 1, in order to conduct a comparative analysis between traditional animation samples and contemporary animation samples (within the past five years), it is imperative to establish judicious criteria for sample selection in advance.

The participants of the phase 2 are experts in the animation and watercolor industry.

The phase 3 population participants were undergraduates and junior college students majoring in animation, fine arts, art design, and others.

1.4.2 Location of research

As mentioned above, different cultural backgrounds have different perspectives on the language of watercolor painting and animation production. At the same time, watercolor art and digital animation are both international media with distinct dissemination characteristics, each with profound developments in various countries and regions. Therefore, this study is based on a global cultural background,

with the main research locations being in China and Thailand. The primary sources of information and samples are in Hainan Province, China, and Mahasarakham Province, Thailand. The main participants in the study are mainly teachers and students from Haikou University of Economics and Mahasarakham University.

1.4.3 Research methodology

The research methodology can be summarized into the following steps:

(1) Problem Identification: Utilize qualitative analysis methods, including literature review and expert interviews, to identify and define the research problem.

(2) Objective Clarification: Based on the identified research problem, clarify the research objectives to guide the study. To provide theoretical foundations and practical guidance for professionals, students, and educators in the field of animation, aiming to improve production efficiency and expand distribution channels through innovative methods. Additionally, this research compares the integration of traditional watercolor and animation, enhances the expressive capabilities of watercolor language, improves animation production efficiency, reduces the difficulty of watercolor art aesthetics, and breaks down the barriers between traditional art and new media mediums.

(3) Research Planning: Develop a comprehensive research plan, including the formulation of research questions, determination of target audience and participants, and the design of survey questionnaires.

(4) Data Collection: Collect data from the chosen sample using the designed survey questionnaires.

(5) Quantitative Analysis: Analyze the collected data using quantitative analysis methods to derive statistical insights and patterns.

(6) Qualitative Analysis: Employ qualitative analysis methods to gain a deeper understanding of the research results.

(7) Mixed Analysis: In the subsequent testing phase, utilize a mixed analysis approach, combining survey questionnaires and in-depth interview tools.

(8) Summary and Discussion: Finally, summarize and discuss the overall research results, drawing conclusions and implications from the findings.

1.4.4 Scope of contents

(1) Traditional watercolor art style.

(2) Digital animation represented by two-dimensional forms.

(3) Digital animation production integrating watercolor language expression and traditional culture.

1.4.5 Limitation

(1) Computational Intensity: The computational resources required for simulating complex watercolor techniques in real-time may pose challenges, impacting the accessibility of the method for animators with limited hardware capabilities.

(2) Artistic Interpretation: The translation of watercolor techniques to the digital realm may require subjective artistic decisions, and achieving a balance between control and spontaneity may be challenging.

(3) File Size and Storage: Detailed simulations of watercolor techniques could result in larger file sizes, necessitating efficient storage solutions to manage the increased data load.

1.5 Significance of the research

(1) It gives watercolor language a new way of expression and makes ancient watercolor art more acceptable to modern people through animation media.

(2) Strengthen the expression ability of watercolor language, so that watercolor language can express more content in animation works.

(3) The intervention of watercolor language enriches the animation production method and adds more artistic elements to the animation production.

(4) Find a new research direction for watercolor language expression in the Chinese production environment and provide convincing theoretical and practical support for the combination of the two.

1.6 Definition of terms

1) Watercolor Techniques

This indicates a focus on traditional artistic methods, specifically watercolor techniques. Understanding and replicating these techniques in a digital environment may involve studying the properties of watercolor pigments, blending, transparency, and brushstroke styles.

2) Linguistic Expression

The use of "linguistic expression" in the context of visual arts is intriguing. It may imply developing a language or a set of descriptors to articulate watercolor techniques. This linguistic aspect could involve creating a standardized vocabulary or coding system to describe and communicate watercolor methods in the digital animation domain.

3) Digital Animation Production Environment

The research is situated within the domain of digital animation production. This involves the use of technology to create animated content. In this context, the

study may explore how traditional artistic techniques, such as watercolor, can be integrated into digital animation workflows and tools.

4) New Method

The emphasis on a "new method" suggests an innovative approach or technique that goes beyond existing practices. This could involve the development of algorithms, software tools, or frameworks specifically tailored to replicate watercolor aesthetics in digital animation.

5) The Visual Characteristics of Watercolor

Watercolor is known for its transparency, softness, and fluidity, which give it a unique artistic language. Through the layered transparency of its colors, watercolor can reveal subtle changes in light and shadow, as well as gradual transitions in color. By combining wet and dry techniques, watercolor creates rich textures and intricate details, bringing forth a natural, dreamy, and ethereal quality. These characteristics make watercolor an ideal medium for conveying emotions such as lightness, dreaminess, and serenity.

6) Expression in Watercolor

The language of watercolor not only holds visual allure but also conveys the artist's emotions and thoughts through varying intensities of color and brushstroke dynamics. Its fluidity allows watercolor to capture fleeting emotional shifts and express a sense of rhythm and spontaneity. This expressive capacity is frequently employed in subjects requiring subtle emotional conveyance, such as natural landscapes and intimate portrayals of human emotions.

7) The Extension of Watercolor Language through Digital Technology

In digital animation production, digital tools like Photoshop and After Effects can simulate and even enhance traditional watercolor effects. These tools allow animators to redefine watercolor's expressive language in a digital environment. With digital watercolor, algorithms can control color rendering, flow, and layering, achieving a level of precision and control that is difficult to attain with traditional watercolor. For instance, programs can simulate the diffusion and blending of watercolor pigments in motion, offering viewers a more dynamic and visually impactful experience.

8) Innovative Applications of Watercolor Language in Animation

Incorporating watercolor language into animation is not merely a pursuit of visual effects but also an exploration of narrative and emotional depth. Watercolor's delicate brushstrokes and soft hues can effectively create a unique atmosphere, making it well-suited for portraying poetic scenes such as dreams, memories, and nature. By blending watercolor's spontaneity with the controllability of digital

technology, animators can preserve watercolor's dynamic qualities while more precisely conveying the narrative rhythm and emotional nuances of the work.

9) The Future Development of Watercolor and Digital Animation

As digital technology continues to advance, the use of watercolor language in animation will become more widespread and diversified. Emerging technologies like virtual reality (VR) and augmented reality (AR) offer new possibilities for watercolor-style animation, allowing viewers to immerse themselves in layered and three-dimensional watercolor worlds. This integration not only enriches the aesthetic expression of animation but also opens new avenues for digital animation creation.



Chapter 2

Review of the Literature

In this chapter, the discussion will first address the relationship between watercolor language and digital animation creation, as well as the elements of digital animation in the contemporary era, through a literature review. Following this, an analysis of the current state of watercolor language expression in digital animation production will be conducted. Finally, based on the analysis of related studies, a research framework will be proposed.

2.1 The watercolor language

In the author's view, watercolor art is a kind of painting form that uses water as a medium and uses color to express and convey visual images. It originated in Europe, but during historical development, it gradually spread to all parts of the world and became an important part of the world art field. Watercolor art has unique characteristics in painting techniques, expression forms and theme content. First, the techniques of watercolor painting are very rich, including painting, sprinkling, splashing, splashing and other techniques, so that the picture has a vivid expression and a sense of rhythm. Secondly, watercolor painting has various forms of expression, which can be described delicately or summarized, which makes watercolor painting have unique charm in the performance of natural scenery, human images, architectural landscapes and other aspects. Finally, the theme content of watercolor painting is broad, which can cover all aspects of social life, including history, culture, politics, economy and other fields. In the development process of watercolor art, many outstanding artists have made important contributions to the prosperity and development of watercolor art. For example, the works of British masters such as William Turner and John Constable have become classics in the history of watercolor art. At the same time, with the development of modern art, many contemporary artists are also actively exploring the innovation of watercolor art, which makes watercolor art have a more important position in contemporary art.

2.1.1 Historical evolution of watercolor language

According to historical time, the development is roughly divided into three stages: the first stage is "ancient watercolor painting", which can be traced back to ancient Egypt, India, Greece, Persia and China. The silk painting of the Warring States period of our country can be called "ancient watercolor". Both from the color and the style of the picture reflect the unique charm of watercolor language. The fine honey painting of the Persian dynasty is also a form of "ancient watercolor painting" that is highly regarded by people, and it has a unique feeling. The second stage is

"modern watercolor painting". The watercolor painting of this period is the narrow definition of watercolor painting that we are familiar with now. It refers to the water and watercolor pigments mixed in the special processing of watercolor paper painted pictures. Through the practice of the painter, it has formed a complete set of techniques that are completely different from other paintings. At the same time, with the development of science, the use of light and color and the combination of sketch light and shadow and other modeling factors make the picture give full play to the role of water, forming a unique aesthetic interest. These factors combine organically to form the unique style of modern watercolor painting.



Figure 1 Flowers (c.1710), watercolor on paper

Source: (Kettering, 2021)

In the 18th and 19th centuries, British and American societies regarded watercolor painting as the domain of amateur enthusiasts, primarily due to prevailing social, gender, and class norms of the time. During this period, watercolor was often seen as a leisure activity suitable for affluent women or those with frail health, its intermediate nature between painting and drawing deemed the "inferior" sibling to oil painting. Additionally, the practice of watercolor often occurred in intimate settings without involving financial transactions, thus distancing it from the realm of professional "high art" creation. When professional artist groups in England and America began organizing to promote the development of watercolor, male-dominated organizations, in an effort to elevate the status of watercolor, restricted

female participation. These gender, identity, and class-based notions limited the acceptance and recognition of watercolor within the broader art sphere.

Professional artists in the Dutch Republic of the 17th century held complex attitudes toward the watercolor medium. On one hand, watercolor was considered suitable for amateurs, particularly female enthusiasts, closely tied to the gender norms and social attitudes of the time. Artists such as Gerhard ter Brugghen and Willem Goeree provided guidance to these amateur enthusiasts through their manuals, especially Goeree's "Verlichterie-Kunde," emphasizing the educational and recreational value of watercolor. On the other hand, despite gender and societal barriers, some female amateur artists (such as Gesina ter Borch and Catharina Backer) and certain male artists (such as Gerrit Battem and Herman Henstenburgh) gradually ventured into watercolor creation in a semi-professional capacity, indicating a changing status of watercolor within the artistic sphere. Simultaneously, watercolor was considered suitable for individuals with frail health as a rehabilitative activity, reflecting artists' acknowledgment of the potential value of the watercolor medium. In conclusion, the attitudes of professional artists in 17th-century Dutch Republic toward watercolor were multidimensional, encompassing both its social and cultural restrictions as a leisure activity and demonstrating its potential and value as an art form. (Kettering, 2021)

The predecessor of Chinese watercolor painting is a branch separated from classical painting. The development of art has always been diversified. In the 1970s and 1980s, the art wave of the new period appeared, gradually unifying the evaluation criteria of various paintings, and believing that the beauty of harmony is the final form of art pursuit. When the development direction of Chinese art gradually moved closer to modern art, only Chinese watercolor painting was unique. (Wenbing, 2021)

Introduction In the long history, the development of Chinese watercolor painting has undergone various changes under the subtle influence of traditional painting, western culture, economic influence and political thought. For a long time, people only regard watercolor painting as an art for appreciation. In fact, the mysteries contained in watercolor painting are unfathomable. With the development of society and the continuous improvement of living standards, people are no longer tired of living, and gradually shift their attention to cultural development.(Wenbing, 2021)

The above content analyzes the artistic language expression forms in Chinese watercolor painting works, so we can know that its future development is bright. Under the current open social background, we can look at Chinese watercolor painting art from a tolerant perspective, In the process of continuous excavation and

learning, explore deeper mysteries and create eye-catching artistic language expressions.(Wenbing, 2021)

The production and development of watercolor in China's localization is mainly manifested in the following aspects. First, watercolor painters draw nutrients from traditional Chinese painting art. They borrowed from Chinese painting art in terms of tools, materials and expression techniques, such as the advantages of using ink Xieyi. Such learning helped watercolor painting develop its unique artistic style in China. Secondly, the aesthetic value of watercolor painters reflects the characteristics of Oriental aesthetics. The watercolors they created pursued the aesthetic standards of the Chinese nation, and used the aesthetic spirit and aesthetic style of traditional Chinese art. Such efforts make Chinese watercolor paintings have distinct personality characteristics. Third, watercolor painters apply their own way of thinking of national culture. They used Chinese painting techniques and ink as food for watercolor painting, created new techniques suitable for watercolor painting, and tried to preserve the characteristics of watercolor painting. Such efforts enable Chinese watercolor painting to give full play to the dexterity, charm and freehand spirit of Chinese painting. Finally, the localization of watercolor painting is also reflected in the reference and research of traditional Chinese painting art by watercolor painters. Early watercolor painters began to seek nutrients from traditional Chinese painting art and developed a unique art of watercolor painting. Their efforts laid the foundation for the localization of Chinese watercolor painting, and at the beginning of the last century, many painters devoted themselves to the nationalization of watercolor painting and achieved remarkable achievements. To sum up, the localization of the production and development of watercolor in China is mainly presented with traditional Chinese painting art, the embodiment of Oriental aesthetic value, the use of their own national culture of thinking, and the reference and research of traditional painting. These efforts make Chinese watercolor painting have a unique style and characteristics, showing the spirit of Chinese culture and aesthetic consciousness. (Xuefeng, 2016)

Under the visual reconstruction theory, watercolor language gets the following changes:

Firstly, digital watercolor extends the visual beauty of traditional watercolor art and provides more space for the development of traditional watercolor art. Traditional watercolor painting has achieved remarkable artistic achievements in terms of media materials, language forms and artistic connotations. However, the rapid development of Internet technology and digital media art has had a huge impact on the development of traditional painting. In this context, watercolor painting

gradually lost its vitality and could not meet the needs of the public for visual pursuit. Therefore, digital watercolor gets rid of the shackles of traditional media, changes the thinking and concept of traditional painting, brings watercolor art into a new visual space, and provides more possibilities for the development of watercolor art. Secondly, digital watercolor art realizes the re-creation of traditional watercolor art. Digital watercolor breaks through the limitation of traditional watercolor plane static image, and introduces watercolor art into the visual space of stereo, dynamic and sound. Currently, 3DMax, Maya and Lightwave are the most popular 3D animation software in the world. On the one hand, 3D technology can create a virtual interactive space, which plays an important role in the wide spread of watercolor painting. Traditional watercolor is usually displayed in a fixed physical space, while digital watercolor is constructed into a virtual display space through images, video and Internet technology. Digital watercolor art realizes the simulation and reproduction of traditional watercolor art. Finally, digital watercolor art breaks the limitation of traditional watercolor materials and media, and realizes the multi-dimensional expression and experience of technology and art. Computer technology makes watercolor images transfer from physical space to virtual space, from plane static to three-dimensional dynamic, so that the audience can experience the painter's multi-dimensional fusion and expression in vision, hearing and touch, and construct a free, open, cross-time and space interactive space, so that the aesthetic realm of watercolor art has been highly sublimated.(Li, 2020)

To sum up, watercolor art has experienced a rapid localization process in China, which is closely related to the natural closeness of traditional Chinese painting on water-based pigments. At the beginning of the 20th century, Chinese watercolor art absorbed western painting techniques and integrated with local painting language to form a unique Chinese and western artistic thinking. This kind of integration not only reflects the change and development of Chinese society, but also shows a distinct realistic imprint and the spirit of The Times in the works of different historical periods. However, the insufficient research and combing of watercolor art in academic circles has led to the failure of its historical research and systematic exhibition activities to form a sustained influence. In general, the history of Chinese watercolor art is the result of the combination of western painting techniques and Chinese local culture, which promotes the overall development of Chinese art and has an important impact on the history of modern Chinese art.

2.1.2 Characteristics of watercolor language

The picture has bright, light characteristics, pure color and transparent color. This is mainly because watercolor is a painting method that uses water and

transparent pigments. In the performance process, the fluidity of watercolors is extremely strong, which is determined by the characteristics of watercolors using water as the medium. At the same time, due to this special material advantage, the brush for watercolor painting needs to be affirmed, and unnecessary "revision" will make the picture depress the brilliance of watercolor painting.

William Russell Flint made outstanding contributions to the field of watercolor portraiture during the Victorian era in 19th century Britain. As a master of watercolor who bridged the past and the future, Flint propelled the new development of watercolor portraiture with his unique artistic perspective and creative techniques. Firstly, drawing from the socio-cultural milieu of the Victorian era in the 19th century, the flourishing British economy and culture provided a fertile ground for Flint's artistic endeavors. Flint assimilated nutrients from the classical painting tradition, and through classical study and traditional continuation, he formed his own unique watercolor painting style. Additionally, Flint's choice of subjects in watercolor portraiture reflects his profound understanding of personal spiritual exploration and literary works. Through his depiction of different narrative plots, he showcased the diversity and depth of his style.



Figure 2"Cecil Lying in Bed," Watercolor
Source: (Shimei, 2022)

Lawrence Alma-Tadema's influence on Flint's work lies in his depiction of women using a romantic painting style, intense and thick coloring techniques, as well as accurate portrayal of human anatomy and skin texture. He was very meticulous in his painting creations; for historical subjects, he would thoroughly research and

investigate data regarding clothing, styling, architecture, etc., before proceeding with his creations. These painting styles and characteristics deeply influenced Flint's painting creations. As a watercolorist in the later Victorian period, Flint extensively absorbed the excellent color application methods and portrayal techniques of predecessors, integrating them into his own creative sensibilities during the process of creation (Shimei, 2022).

The work "Cecil Lying in Bed" vividly portrays the tactile moisture and the graceful posture of the characters, achieved through Flint's adept depiction. Viewers are seemingly able to touch the tangible bodies as a result. Influenced by Lawrence's style of painting, Flint exhibits a preference for portraying elegant and beautiful women. The synergy between characters and their surroundings is finely tuned, emphasizing the delicate skin texture, musculature, and the sumptuous quality of different garments. The translucent background, characteristic of watercolor, serves as a canvas, while the pink midground subtly complements the characters' postures. The watercolor washes gently undulate over the chest, conveying a sense of the model's subtle breathing. The pink hues of the skirt, diffused in the light and backlit areas, delineate varying glosses with finesse.

In addition, the pigment of watercolor is easy to carry, which is suitable for making fresh and bright small paintings such as landscapes. However, because the water dries quickly, it is not suitable for making large works. Therefore, for the creation of watercolor painting, artists need to grasp the language characteristics of watercolor painting itself at the same time, constantly expand and enrich the language of watercolor painting.

Chinese watercolor painting is different from other art types and has a unique artistic language. The creator's cognition of things directly determines the form of expression of the painting. This paper makes a specific analysis according to this point of view. (Wenbing, 2021)

The above content analyzes the artistic language expression forms in Chinese watercolor painting works, so we can know that its future development is bright. Under the current open social background, we can look at Chinese watercolor painting art from a tolerant perspective, In the process of continuous excavation and learning, explore deeper mysteries and create eye-catching artistic language expressions.(Wenbing, 2021)

With its unique aesthetic orientation and performance techniques, watercolor language occupies a place in Chinese art. In essence, it borrowed elements from Chinese ink and wash painting, especially the characteristics of water modeling and ink blending. The characteristics of watercolor painting can be summarized as the use

of color to shape the form, play the physical characteristics of pigments, the pursuit of bright and simple expression and direct emotional transmission. At the same time, it does not conflict with the line modeling of ink and wash painting, the implicit beauty of ink and wash painting, and the characteristics of being good at creating artistic conception but turns these elements into its own advantages. The performance methods of traditional watercolor painting include wet painting method, dry painting method and combination of dry and wet painting method. These methods give watercolor painting unique language style. In general, watercolor painting and traditional Chinese ink painting learn from each other in terms of material use, technique rules and aesthetic concepts, forming its unique expression language.(Xuefeng, 2016)

The performance methods and techniques of traditional watercolor painting are rich and diverse, mainly including wet painting method, dry painting method and dry and wet combination method. Each of these methods has its own characteristics. The wet painting method focuses on the flow and fusion of colors, the dry painting method emphasizes more on detailed textures and levels, and the combination of dry and wet painting method is the combination of the two, which can create a unique visual effect. In terms of techniques, traditional watercolor painting uses a variety of techniques, such as dry pen stippling, drying pen, seeping, dyeing, breaking color, precipitation, whitening, washing, scraping and so on. These techniques have their own emphasis, together constitute the rich expression of traditional watercolor painting. For example, dry pen stippling creates contrast and delicate textures, dry pen is used to depict rough or dry surfaces, and percolation and Dyeing techniques use the fluidity of watercolors to create natural gradients and slinky effects. In general, the performance methods and techniques of traditional watercolor painting reflect the artist's deep understanding and application of materials and tools, so that watercolor painting can show a unique sense of beauty and emotional expression.(Xuefeng, 2016)

The performance methods and techniques of traditional watercolor painting are rich and diverse, mainly including wet painting method, dry painting method and dry and wet combination method. Each of these methods has its own characteristics, the dry colorization method focuses on the detailed depiction of the dry picture, and the wet colorization method emphasizes the color flow and penetration on the wet canvas. Color printing, pasting and de-color methods are more about creativity and the use of materials. As for techniques, modern watercolor painting includes waxing method, color line method, clamping oil method, propylene method, leakage washing method, petal color method and sticker method. These techniques allow paintings to present different visual effects, such as waxing to create a unique texture, and oil

trapping and propylene methods to create rich layers using different media. In addition, modern watercolor painting also includes the characteristics of ink and wash painting, such as the characteristics of the pen, the method of ink and the way of color. These elements of ink painting, such as the flexibility of brush strokes, the contrast of shades of ink and the use of color, greatly enrich the expressive power of watercolor painting. From a comprehensive point of view, the performance methods and techniques of modern watercolor painting not only reflect the continuation of traditional skills, but also show the diversity and richness brought by artistic innovation and material innovation.(Xuefeng, 2016)

Watercolor language also reflects its unique spiritual pursuit. The special "mirror beauty" is mainly reflected in its unique way of artistic expression and aesthetic pursuit. First, watercolor painting draws on the artistic spirit of Chinese ink and wash painting, using brush and ink method of ink painting, as well as the inherent aesthetic of Chinese classical painting, giving the work deep cultural heritage and unique Oriental aesthetics. Secondly, watercolor emphasizes the exploration of transparency and fluidity and creates a visual effect full of change and vividness through the harmonious combination of water and color. For example, in the picture processing, such as the performance of snow mountains, only depict the general idea, using the misty sense of cloud, make it appear sometimes, showing a mysterious and charming beauty. In addition, the paper texture of watercolor painting is also a part of its beauty, which is coordinated with the picture effect to enhance the overall feeling of the artwork. In general, "mirror beauty" in watercolor painting is through the reference and innovation of traditional ink painting techniques, as well as the in-depth understanding and application of material characteristics, showing a unique artistic style with both Oriental traditional charm and modern sense.(Xuefeng, 2016)

The content expressed in watercolor works of art needs to pass on its central idea to the audience through a certain artistic language. Chinese watercolor paintings mostly contain unique national elements, which all reflect distinctive Chinese cultural characteristics in creative thought, composition style, emotional expression and artistic conception. The artistic language expression form of Chinese watercolor painting is similar to that of Chinese traditional painting.(Wenbing, 2021)

To sum up, the characteristic of watercolor language lies in its unique aesthetic taste and expressiveness. The core of watercolor art lies in the agility of water and the transparency of color. The combination of the two creates the unique charm of watercolor. In design and painting, watercolor is not only a convenient means to express design thinking, but also an ideal carrier for emotional and creative expression. The performance techniques of watercolor are rich and diverse. Through

continuous exploration and experimentation by artists, an independent language system has been formed, which enhances the technical depth and aesthetic value of its artistic expression. At the same time, watercolor language not only reflects the universal regularity of art, but also enhances the expressiveness and spiritual connotation of the work in the integration of artistic conception, composition and other aesthetic elements. In the context of global cultural diversity, watercolor painting shows the richness and freedom of human creativity and is an innovative artistic resource. Therefore, watercolor language occupies an important position in artistic expression and is a unique branch of painting language.

2.1.3 The unique historical position of watercolor art language in Chinese culture

Watercolor painting is a foreign form of painting. From the 18th century, Castigning, Wang Zhicheng and other Western missionaries came to China, to the early 21st century, the language of Chinese watercolor painting has experienced many changes. This process is not only the artists' active exploration and innovation, but also the rational reflection and the change of the concept of The Times under the historical background of the comparison between Chinese and Western cultures.

Since the missionary Castiglione came to China in 1715 to teach western painting, watercolor painting has been introduced to China for 300 years. During this period, it experienced the transformation from "watercolor" to "Chinese watercolor", which was complicated and tortuous. In particular, the occurrence and development of "Chinese watercolor" in the past hundred years is the most significant, making watercolor painting an important part of modern and contemporary Chinese art.

Since the reform and opening, our country watercolor has made great achievements. The active exploration of watercolor painters in personality style, artistic language and form greatly promoted the development and academic improvement of watercolor art. At the same time, based on learning western watercolor painting techniques, Chinese artists also combined them with traditional Chinese painting to create watercolor paintings with Chinese characteristics.

In general, the unique historical position of watercolor art language in Chinese culture is reflected in the following aspects: first, as an exotic painting, it enriches the expression method of Chinese art; Second, it promoted the reform of values, aesthetics and methodology of modern Chinese art. Third, it promoted the exchange and integration of Chinese and Western art.

Chinese watercolor painting has absorbed many elements of traditional ink and wash painting, notably the pursuit of artistic conception, special brushstrokes and ink distribution, and the control technique of water application. In the use of materials,

Chinese watercolor painters adopted traditional brush and rice paper, and borrowed the techniques of dot dyeing and layering of ink and wash painting. This unique combination makes Chinese watercolor painting not only retain the form of western watercolor, but also give the works with the aesthetic interest and spiritual connotation of the East. For example, by adding a specific amount of water to adjust the color, it shows the characteristics of traditional Chinese paintings in transporting water. In addition, Chinese watercolor painting in the performance of the magnificent scene, but also show the vivid atmosphere and profound artistic conception of ink painting, making the work has the realism of Western painting, but also the poetic style of Eastern art. This fusion not only presents the blending of Chinese and Western cultures, but also enriches the personal style of the painter, so that Chinese watercolor painting shows its unique artistic charm on the global art stage.(Chen, 2023)

The artistic concept of traditional ink painting has exerted a profound influence on the development of Chinese watercolor painting. The artistic pursuit of ink painting makes watercolor painting more distinctive and forms a unique artistic perspective. Inspired by traditional Chinese painting, watercolor artists combine ink language, aesthetic taste and spiritual connotation with watercolor paintings in terms of materials, techniques, colors and forms, making their works closer to the emotions and cultural identity of Chinese people. For example, ink and wash painting emphasizes the use of "pen" and "ink", which is also reflected in watercolor painting. The painter controls the flow of water to regulate the color, which reflects the spirit of ink and wash painting. At the same time, due to the short development time of watercolor painting in China, artists continue to explore the integration of Chinese painting elements into the medium of watercolor, so that Chinese watercolor painting presents a unique artistic style in a short time and has made considerable achievements. This combination of Chinese and western art forms not only provides new possibilities for the creation of Chinese watercolor painting, but also allows Chinese traditional culture to be inherited in the artistic expression of the new era.(Chen, 2023)

Traditional Chinese painting pursues artistic conception, ink and ethereal composition, and these elements are integrated into watercolor painting to enhance the uniqueness of watercolor painting. For example, Chinese painting emphasizes the use of ink to divide five colors, relying on light ink and heavy color to show rich levels, while watercolor painting just uses the fluidity of water and color transparency to form a unique artistic style. In addition, the whitening technique of Chinese painting is reflected in the exquisite control of space in watercolor, as well as the implicit and

restrained use of color, which makes the painting show the spiritual connotation of Eastern aesthetics. This combination of traditional ink language and western watercolor materials makes watercolor painting not only convey the spirit of traditional Chinese culture, but also give it international artistic expression, forming a distinct and national characteristics of the artistic style.(Chen, 2023)

Image, as the core of traditional Chinese art, represents the classical culture's deep consideration of art and beauty. This concept has been widely used in the art of painting, especially in Chinese watercolors, where it has triggered new creativity. This paper traces THE HISTORICAL origin of the word "image", from the earliest appearance in Zhou Yi, to Liu Xie's discussion in Wen Xin Diao Long in the Southern and Northern Dynasties, and then to the appearance of the aesthetic form of image in the ink freehand painting in the Tang and Song Dynasties. Imagery is seen as a combination of image and meaning, reflecting both objective objects and subjective emotions. The concept of "image" put forward by Liu Xie in Wen Xin Diao Long has experienced profound development and evolution. Initially, "image" refers to the hexagonal image in Zhou Yi and was later extended by Liu Xie to be a key element in literary and artistic creation. Over time, this concept has taken a central place in traditional Chinese art, especially in ink freehand brushwork. Image is not only the reproduction of objective objects, but also the product of artists' subjective feelings. It is the organic combination of image and meaning, reflecting the integration of "objective objects" and "subjective emotions". During the Tang and Song dynasties, the aesthetic of imagery was significantly reflected in ink paintings. Painters expressed deep emotions through the depiction of natural scenery, achieving a high degree of unity between art and emotion. In modern times, this concept has been further extended to the field of watercolor painting, forming a unique Chinese image watercolor painting. This style of painting not only pursues the objective representation of the image, but also emphasizes the expression of subjective emotions and artistic processing, showing a more free and abstract modeling style. Therefore, imagery not only provides a new perspective and language for the creation of Chinese watercolor painting, but also becomes an important bridge connecting traditional and modern, eastern and western art. (Fang, 2018)

As the first Chinese animated feature film, Princess Iron Fan not only opened a new era of Chinese animated films, but also had a profound impact on the world of animation. This special significance of the animation works is the use of watercolor art. Its unique artistic style, such as ink painting and poetic expression, brings new perspectives and inspiration to the international animation art. Japanese animation master Osamu Tezuka was inspired to give up medicine and devote himself to

animation creation, and then many far-reaching works were born. Princess Iron Fan shows the unique charm and cultural confidence of Chinese culture, stimulates the enthusiasm and exploration of national animation creation by generations of animators, promotes the formation and development of Chinese animation style, and contributes to the diversity of animation art in the world. (Lijun, 2023)

Contemporary Chinese watercolor painting is closely related to traditional watercolor painting. First, in terms of techniques, the techniques of traditional watercolor painting have been influenced by Chinese painting (ink painting), so that Chinese watercolor painting has similar solvents and techniques. This similarity allows contemporary Chinese watercolor painters to inherit and continue the techniques of traditional watercolor painting, including the characteristics of realism and transparency of watercolor. Secondly, in terms of aesthetic thinking, contemporary Chinese watercolor painting retains the aesthetic characteristics of Chinese watercolor painting. When watercolor painting was introduced into China, it was influenced by the traditional Chinese aesthetic and combined with it to create a unique Oriental style of watercolor painting. This kind of watercolor emphasizes artistic conception and interest and pays attention to the expression of the aesthetic concept of traditional Chinese culture. At the same time, the attitude of contemporary Chinese watercolor painters towards the ontological tradition and the attitude of involvement in society also retains the aesthetic characteristics of Chinese watercolor painting. The media characteristics of watercolor painting do not become a limitation in the creation of contemporary Chinese watercolor painters, but a tool to express individual experience. Therefore, contemporary Chinese watercolor painting retains the unique flavor and characteristics of Chinese watercolor painting in the techniques and aesthetic thinking.(Zhao, 2015)

To sum up, the new development path of Chinese watercolor painting is reflected in several key aspects:

1. Integration of tradition and modernity: Chinese watercolor painting should combine traditional culture with western watercolor techniques to form a unique artistic style. It emphasizes the integration of Chinese and Western art, neither blindly following the West, nor completely abandoning Western elements.

2. Pay attention to freehand brushwork in Chinese ink painting: Use the freehand brushwork technique of traditional Chinese painting to add traditional charm to watercolor painting. This fusion not only shows the traditional aesthetics of Chinese painting, but also expands the expressive power of watercolor painting.

3. Pay equal attention to theory and practice: strengthen the theoretical research of watercolor painting and combine it with practical creation. Theoretical

development should be synchronized with artistic practice to guide and enrich creation.

4. Innovation and transcendence: encourage innovative thinking and experimental spirit, so that Chinese watercolor painting can achieve new breakthroughs on the basis of inheriting the tradition. Creators should go beyond the traditional category and explore personalized and epochalized expressions.

In general, the development of Chinese watercolor painting should be a process of combination of eastern and western art, and complementation of tradition and modernity, aiming to form a unique artistic language with Chinese characteristics and the spirit of The Times.(Xuefeng, 2016)

To sum up, watercolor art language occupies a unique historical position in Chinese culture. As one of the oldest painting forms in the world, watercolor art runs through the history of Chinese art with its unique aesthetic value and expression. This artistic language is characterized by the agility of water and the transparency of color, showing a unique aesthetic taste, which is consistent with the artistic concept of pursuing artistic conception, emotional expression and natural beauty in traditional Chinese painting.

In China, watercolor art is not only an important medium of artistic expression, but also the basis of art education and design training. Its convenience and particularity make it possible for artists and designers to express their ideas and creativity more freely and richly through the language of watercolor. The study and practice of watercolor art plays an important role in improving the creative inspiration and artistic accomplishment of designers.(Li, 2010)

To sum up, the historical status of watercolor art language in Chinese culture is not only due to its ancient and independent art form, but also lies in its deep integration with traditional Chinese art concepts, as well as its far-reaching impact on art and design education.

2.1.4 The characteristics of Chinese and Western artistic ideology reflected by watercolor language.

As a kind of foreign painting form, the language characteristics of watercolor not only reflect the characteristics of the western art concept form, but also integrate the traditional Chinese art concept. In terms of color function, watercolor painting has many similarities with western traditional painting, such as paying attention to objective realism. At the same time, watercolor painting has many internal connections with traditional Chinese painting in the use of watercolor and tools, such as water, color, pen, ink and other skills of Chinese painting are extremely rich.

However, Chinese watercolor painting does not simply copy the western watercolor painting techniques but based on the organic integration of Chinese and western painting concepts, it infuses the national traditional cultural characteristics and aesthetic taste and forms an innovative performance. For example, Chinese artists have learned western watercolor painting techniques and combined them with traditional Chinese painting to create watercolors with Chinese characteristics. This strategy of "using Western learning" makes Chinese watercolor painting deeply rooted in the soil of national life and shows the thoughts and feelings of the nation.



Figure 3 Watercolor Artwork "People's Democracy Advances in Tibet"

Source: (Xuefeng, 2016)

"The Entry of the People's Democracy into Tibet" is a representative work of Wu Guanzhong's watercolor portraiture. As a portrayal of human figures, the spatial allocation for each figure in these two paintings is relatively limited. Consequently, the depiction of facial features such as the eyes and brows are rendered almost indistinct. Thus, the delineation of character traits primarily relies on aspects such as the figure's physique, the colors of attire, and adornments. The advantages of simplicity and the emphasis on capturing the spirit inherent in traditional Chinese ink painting are notably evident in these works. The handling of colors predominantly draws inspiration from the outcomes achieved in ink wash painting (Xuefeng, 2016).

In addition, Chinese artists often apply the painting technique of "blank", which is a traditional Chinese ink painting, to Chinese watercolors. "Blank" is a unique technique of expression, has a very good artistic effect. Turning to the history of Chinese painting, five thousand years ago in the Neolithic Age, the Stork Stone Axe Picture unearthed in Lin Ru, Henan Province and the dance pattern painted

pottery bottle painting in Datong County, Qinghai Province, both have the properties like watercolor painting.

The concept of painting influenced by watercolor language gradually integrated the spirit of Chinese ink painting in the modern development. It is not only the display of tools and skills, but also the communication of cultural connotation and humanistic spirit. By drawing on the artistic spirit of ink and wash painting, Chinese contemporary watercolor painting emphasizes the beauty of artistic conception and cultural depth, which makes watercolor painting not only limited to superficial realism, but also deeply integrated into the spirit and aesthetic of traditional Chinese art.(Xuefeng, 2016)

The integration of western watercolor painting and traditional Chinese culture is manifested in the innovative practices and works of artists. In the early years, Li Tiefu integrated western painting techniques into Chinese painting elements, and used Chinese brush and rice paper to create watercolor paintings with national style, such as his famous work Sichuan E Mei. At the same time, contemporary painters such as Tao Shihu absorbed the exquisite painting style of Song and Yuan dynasties and explored the mysterious space under Taoist thought in his snow scenery series of Twilight. This practice not only makes watercolor painting show its unique artistic style on the world art stage, but also makes it a good example of the integration of Chinese and Western cultures. Through the dialogue between tradition and modernity, east and West, the language, aesthetic interest and spiritual connotation of Chinese watercolor painting are more in line with the aesthetics and emotions of Chinese people, and it has become an art form with unique national characteristics. Under the background of globalization and the eastward expansion of Western culture, the formation of such characteristics prevents the self-loss of Chinese watercolor art and ensures the inheritance of national spirit in the media of the new era.(Li, 2020)

In general, the characteristics of Chinese and western artistic ideology embodied by watercolor language are reflected in the organic combination of western realism and Chinese traditional imagism, which also reflects that Chinese watercolor painting actively absorbs and integrates foreign artistic elements while maintaining its uniqueness.

To sum up, watercolor plays a unique and complementary role in Chinese and western painting languages. Western watercolor painting focuses on realism and delicate changes in color, and its techniques and expressiveness emphasize the accurate capture of light and shadow and texture. In contrast, Chinese watercolor combines the spirit and aesthetics of traditional Chinese painting, emphasizing the use of imagery and ink, and focusing more on expressing the subjective feelings and

artistic conception of the painter. While absorbing modern western art theories, Chinese watercolor painters also maintained national characteristics and cultural heritage, forming a unique Oriental poetic artistic style. This style not only breaks through the limitations of realistic colors, but also boldly tries the use of emotional colors and symbolic colors. Therefore, in Chinese and Western painting languages, watercolor is not only a display of techniques, but also a bridge of cultural exchange and artistic innovation.

2.1.5 The interpretation of watercolor language on painting language

Watercolor painting is a unique art form, which has its own artistic language. This language is reflected in the elements such as shape, space, color, water use, brushwork, media and the aesthetic concept they depend on, which together constitute a variety of forms of expression to express emotions.

Firstly, the use of water in watercolor painting is the primary factor to reflect the characteristics of watercolor painting. Water plays a key role in the performance of watercolor, such as dilution of pigments, wetting, seepage, washing and so on. As a kind of spiritual spirit, water is not only a kind of "emptiness", but also a special material existence.

Secondly, watercolor painting as the most expressive artistic conception of color painting language, other painting is difficult to compare. Its artistic language can not only enable us to better improve the quality of watercolor painting, but also help us to understand and explore the essence of painting art more deeply.

In the pattern of contemporary art, only a few paintings can maintain their original state without absorbing other painting languages and exist independently. The commonality and mutual integration between different types of paintings make each painting on the easels absorb and learn from other types, showing an eclectic and diversified development trend. This trend provides more space for the development of personalized language forms. As the quintessence of Chinese culture, Chinese ink painting has a long history and remarkable achievements. However, the drawing technique of watercolor is increasingly out of line with the trend of today's times, unable to fully express the thoughts, emotions and will of the author, so watercolor is constantly trying various experimental changes.(Li, 2020)

Artists have proposed a method to reconstruct the painting process from static Chinese paintings. First, they defined a partial order relation between strokes, and then constructed a multi-stage structure to determine the drawing order. They use natural evolutionary strategies (NES) to optimize stroke order, while encoding both visual similarities of strokes (such as color and contour) and changes in strokes during painting (including ink moisture, ink thickness, and shape). In this way, they were

able to reasonably reproduce the rendering process of the Chinese painting and demonstrate through a user study that the reconstructed order is comparable to the order specified by the artist interaction. This process can be used for painting teaching, painting animation and image stylization. In the future, they plan to investigate data-driven methods that learn the painting style of a particular artist and use it as an additional attribute in the construction process of personalized drawing sequences.(Tang&Dong et al., 2017)

The aesthetic value and significance of watercolor art in digital painting lies in its ability to transcend the material medium limitation of traditional watercolor and realize the multidimensional expression and experience of technology and art. Traditional watercolor, with its unique transparency and fluidity, presents the beauty of mixed colors and vivid lasting appeal. Digital watercolor reproduces and reconstructs these artistic languages and visual styles through computer technology to create a new visual experience. It not only inherits the western perspective space modeling and rich colors, but also integrates the virtual and real beauty of Chinese ink, which provides a broader development space for traditional watercolor art. Digitalization is not a replacement, but an extension, which makes the aesthetic field of watercolor art span time and space. Viewers can obtain three-dimensional artistic feelings of vision, hearing and touch through interaction, and improve the aesthetic realm of watercolor art.(Li, 2020)

In the digital painting era, watercolor language has experienced significant changes and transformations, mainly reflected in the following aspects:

1. Expansion of visual expression: Digital technology makes the visual effect of traditional watercolor art expanded, creating more diverse forms of expression. For example, the fluidity, transparency, texture and other characteristics of traditional watercolors are strengthened and new interpretations in digital processing.
2. Multi-dimensional integration of technology and art: digital watercolor breaks the limitation of traditional media and realizes the multi-dimensional expression of technology and art. For example, the application of 3D animation technology enables watercolor art to be dynamically displayed in 3D space, which increases the interactivity and immersion.
3. Cross-border integration and new art forms: Digital watercolor can not only simulate and reproduce traditional watercolor effects, but also combine with other art forms to create new visual forms and images. This cross-border integration extends the performance space and application field of watercolor art.

4. Interaction and supplement between tradition and modernity: Traditional watercolor art and digital watercolor art influence and complement each other, and jointly provide a more diverse expression space for artistic activities.

5. Expansion of application fields: watercolor art in the digital painting era is not only limited to the field of pure art, but also widely used in advertising, film and television, animation, games, graphic design and other public fields, showing the transformation of its practicality and social attributes.(Li, 2020)

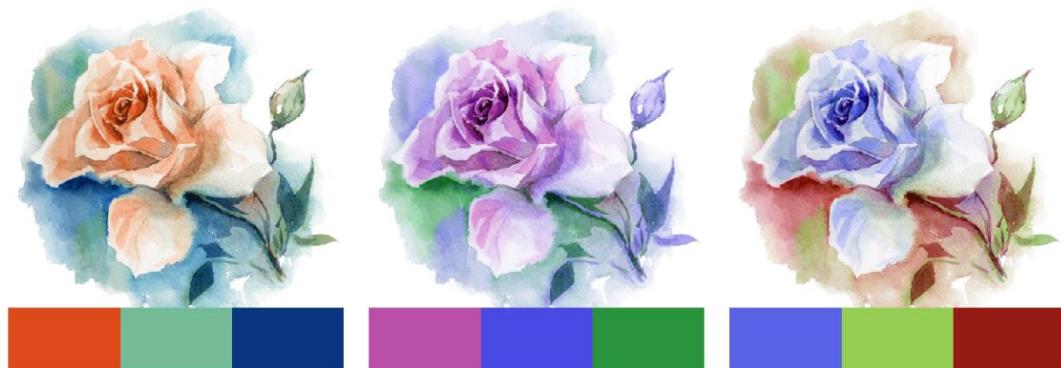


Figure 4Pigment-based watercolor painting recoloring.

Source: (Aharoni-Mack, Shambik, & Lischinski, 2017)

In the domain of digital painting, artists endeavor to explore alternative color palettes for existing watercolor artworks. This proves to be particularly beneficial for generating alternative versions of existing artworks or selecting color palettes relevant to new creations. Initially, artists' tools estimate the original pigment-based color palette used in creating the artwork. Subsequently, the artwork is decomposed into a series of pigment channels, each corresponding to a color in the palette. For both tasks, the Kubelka-Munk model is employed, which predicts the reflectance of specific pigment mixtures. Each channel in the decomposition is a piecewise-smooth mapping specifying the concentration of a color from the palette in the image. Another estimated mapping specifies the total thickness of pigments in the image. According to the Kubelka-Munk model, the blending of these pigment channels reconstructs the original artwork. Subsequently, artists can manipulate individual colors from the palette by re-blending the pigment channels interactively at a desired rate (Aharoni-Mack, Shambik, & Lischinski, 2017).

In recent years, AI technology has penetrated into the realm of watercolor art research and has even influenced all visual arts. The application of AI technology in the field of visual arts can be broadly categorized into two main domains: analysis of existing artistic works and creation of new artistic works. In terms of analysis, AI can facilitate a deeper understanding of artworks and their historical backgrounds through

methods such as image recognition, classification, and retrieval of similar works, thus contributing to the generation of new knowledge in art history research. In creative practice, the utilization of AI, particularly through techniques like Generative Adversarial Networks (GANs), has provided artists with tools to generate novel artistic works, thereby fostering innovation and diversity in artistic expression. The advancement of such technology not only expands the boundaries of artistic creation but also initiates profound discussions on the essence of art, criteria for evaluating artistic value, and the relationship between art and technology. The application of AI in visual arts research and creation reflects a new trend of integrating technology and art, which promotes innovation and development in the field of art.

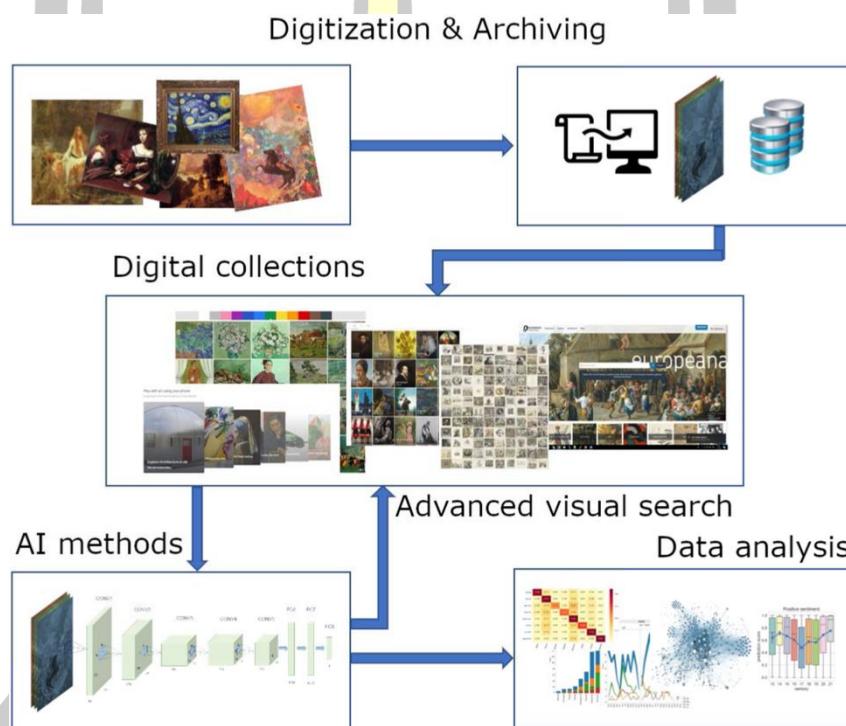


Figure 5 The process from digitization to advanced computational analysis using AI methods

Source: (Cetinic & She, 2022)

The classification, object detection, and similarity retrieval of artworks within datasets predominantly rely on deep learning models, particularly Convolutional Neural Networks (CNNs). Initially, for automated classification of artworks, AI can identify and categorize artworks based on criteria such as artist, style, or genre, typically involving the extraction of features from artwork images and utilizing machine learning algorithms. Concerning object detection, AI can recognize and label specific objects, faces, or other distinctive elements within artworks. Similarity retrieval entails in-depth analysis of artworks using AI, capturing not only their content features but also stylistic attributes, thereby identifying visually similar or

stylistically consistent artworks. These technologies not only facilitate the automated organization and analysis of vast collections of artworks but also foster the generation of new knowledge in art history research. By examining the relationships between specific artworks or collections of an artist's works, they unveil the historical context of artistic development (Cetinic & She, 2022).

The practical and theoretical considerations regarding AI in the creation of art primarily encompass the application and innovation of technology, the originality and novelty of artworks, and the evaluation of artistic value. From a technical standpoint, the creation of AI art relies on algorithms such as deep learning and generative adversarial networks, which are capable of processing and generating images with complex textures and styles. Theoretically, AI art challenges the concepts of traditional artistic creation, including authorship, the originality of artworks, and the process of artistic creation. Furthermore, the evaluation of AI art is also a complex issue, involving not only the degree of technological innovation but also visual representation and cultural novelty. With the development of AI technology, its application in artistic creation will continue to drive the exploration of new modes of expression and creative practices within the art world.

Traditional watercolor painting and digital painting have mutual influence and complementary relationship. Digital painting expands the visual beauty of traditional watercolor art by simulating and reproducing the artistic effect of traditional watercolor and provides more space for the development of traditional watercolor art. Digital watercolor breaks through the static plane image of traditional watercolor, and introduces watercolor art into three-dimensional, dynamic and sound visual space. Digital painting technology can create a virtual interactive space, through the image, video and Internet technology to build the traditional watercolor into a virtual exhibition space. Traditional watercolor is usually displayed in a fixed physical space, while digital watercolor is constructed into a virtual display space through images and Internet technology. Traditional watercolor art and digital watercolor art influence and complement each other and provide a variety of artistic expression space for artistic activities in various fields of society.

The future development of watercolor will have new space in digital painting. Digital painting enables multidimensional expression and experience of watercolor technology and art by going beyond the limitations of traditional watercolor material media. In the virtual space, dynamic, 3D and sound display modes of digital watercolor painting can be realized. Audiences can not only interact with digital watercolor art anytime and anywhere, but also experience multi-dimensional artistic feelings of vision, hearing and perception, creating an aesthetic field that spans time

and space. Of note is that most art museums, galleries and auction houses were closed this year due to the coronavirus outbreak, and artists' watercolors could not actually be displayed as planned. Only by making full use of strong technical and functional advantages, and giving play to its own practicality and technology, digital painting can obtain a broader and free art space and achieve sustainable development in the future. The development of digital watercolor will bring new ways and possibilities for watercolor art.(Li, 2020)

In general, the interpretation effect of watercolor language on painting language is manifested in its unique art form and aesthetic concept. It conveys emotions in its own unique way and shows the diversity and depth of painting art.

To sum up, as an important branch of painting language, the uniqueness of watercolor language lies in its flexibility and transparency. Watercolor art creates unique visual effects and artistic appeal through the fluidity of water and the transparent level of color. This language not only reflects the universal regularity of art, such as artistic conception, composition and other aesthetic elements, but also particularly emphasizes the immediacy and freedom of painting, so that artists can express design thinking more directly and naturally.

Watercolor language has shown its special role in designing freehand drawings and finished drawings. It is not only a simple way of applying color, but also an excellent record of the expression of design thinking. In the context of global cultural diversity, watercolor hand-drawn drawings can help viewers break through the limitations of technical images in the computer age and regain their understanding and appreciation of human creativity and manual art.(Li, 2010)

To sum up, watercolor language occupies an important position in the field of painting. Its convenience, particularity and aesthetic value not only enrich the forms of artistic expression, but also provide a rich means of expression and inspiration for design thinking.

2.2 The animation creation and factors of digital animation environment

In the author's view, animation creation is a kind of film form based on painting, combined with photography, digital technology and other means to create a visual image and story. It originated in the United States in the early 20th century and gradually developed into an independent art form, which has been widely used in film, television, advertising and education. The process of animation creation includes story conception, character design, background drawing, animation production and post-composition. Among them, the story idea is the basis of animation creation, which determines the theme content of the film, the plot development and the relationship

between the characters. Character design is one of the key links in animation creation, which requires designers to create character images with personality characteristics and expressiveness. Background drawing is an important means to show the environment and atmosphere of the story. Animation is the use of painting skills and digital technology and other means to create dynamic visual effects. Post synthesis is the process of integrating and perfecting each production link, and finally forming a complete animation work. With the development and application of digital technology, the technology of animation creation is constantly updated and improved. The application of digital painting, 3D modeling, special effects production and other technical means makes animation creation more convenient, efficient and vivid. At the same time, with the development of globalization and digitalization, animation creation is also gradually breaking through the traditional framework and mode, and constantly exploring and innovating more expressive and appealing forms of work.

2.2.1 Application of traditional elements in animation creation

Animation production is a multifaceted process that involves the integration of creativity, art, and technology. Initially, a series of images, referred to as assets, are prepared, which are then animated on screen using computer-generated imagery (CGI) or other tools. This process entails the frame-by-frame drawing of images, followed by the simulation of motion through animation software, thereby infusing life into objects. Despite software technology streamlining certain processes such as automatic cleaning, duplication, and rendering of images, the creative aspect still necessitates manual intervention by artists. Animation production transcends mere technological application; it is a creative endeavor that demands a fusion of artistic, technical, and managerial skills from animators. Furthermore, animation projects incur high costs, typically encompassing expenses for hardware, software, electricity, internet, and labor. Each animation project is unique, lacking a standardized production process and formula, with production cycles varying from weeks to months. Although modern software aids in reducing certain costs, animation production remains a field that emphasizes both artistic and technical prowess. In Indonesia, the development of the animation industry has received some government support; however, funding is often limited, which affects the effective implementation of projects (Kusumawardhani & Daulay, 2020).

American animated films show obvious respect and reference for traditional Chinese cultural elements. First, in terms of story background and visual elements, many films choose to set the story in ancient China, while integrating typical traditional Chinese cultural elements, such as traditional architecture, clothing and music. For example, films such as *Mulan* and *Kung Fu Panda* show the rich Chinese

culture. Secondly, in terms of story plot and character design, these animations are not only superficial cultural symbols, but also deeply dig into Chinese philosophy and ideas, such as the concept of "unity of nature and man" and "Unity of the world", which reflects deep Chinese Taoism in the words and deeds of the characters. In addition, the global success of these films also proves their deep understanding and respect for Chinese culture, which not only improves the international recognition of Chinese culture, but also makes a positive contribution to the diversified development of world culture. The open and inclusive attitude of American animation films is a good example for Chinese animation industry to learn from. (Jianping, 2020)

As American animated films, Mulan and Kung Fu Panda have played a significant role in promoting the international dissemination of traditional Chinese culture. By blending Chinese elements with Western narratives, the two films have successfully attracted global audiences and deepened their understanding and interest in Chinese culture. Based on ancient Chinese legends, Mulan shows Chinese family concepts and female heroes, while incorporating Chinese visual art styles into the animation design. By combining the panda, a national treasure of China, and Kung fu, a symbol of Chinese martial arts culture, Kung Fu Panda creates an interesting and insightful story that delves into Chinese philosophy and traditional values. These works have not only achieved commercial success in the international market, but also promoted the global recognition and acceptance of Chinese culture, becoming a model of cross-cultural communication. (Jianping, 2020)

American animated films perform well in integrating the traditional cultural elements of many countries. In addition to traditional Chinese cultural elements, there are also traditional cultures of other countries in depth. For example, the movie Aladdin shows a rich Middle Eastern culture, and its story background, character modeling and music all reflect the characteristics of the Middle East. Coco Nightclub delves into Mexico's "Day of the Dead," showcasing the unique charm of Mexican culture through colorful visual effects and infectious music. In addition, the Norwegian style in Frozen and the Scottish culture in Brave are typical examples of cultural elements of other countries incorporated into American animated films. Through these works, audiences can experience the cultural features of different countries. (Jianping, 2020)

With the continuous development of society and the continuous progress of science and technology, animation as a combination of science and technology and real products, the way of creation, as well as the appearance of the form, have undergone a great change, but the reasoning contained therein, as well as the ideas that the author would like to express, are still expressed by the core ideas and content.

China's traditional culture has a profound historical heritage, and in the context of the new era that emphasizes cultural and artistic creation, animation creators are provided with a stronger impetus and a broader space. The use of traditional cultural elements in animation creation also has the advantage of timing and geographical location for Chinese animation creators. The utilization of traditional elements in animation creation is shown in Figure 6. (Xia&Tirakoat,2024)



Figure 6 The use of traditional elements in animation creation.

Soures: (Xia&Tirakoat,2024)

Under the influence of digital technology, the innovation of traditional techniques of ink and wash painting is mainly reflected in the digitization of the production process of traditional ink and wash painting to improve the efficiency and presentation quality. Through scanning, the painter's works are formed into maps for direct use, which not only significantly improves the production efficiency, but also retains the traditional charm of ink painting to a certain extent. In addition, the intervention of digital technology makes it possible to deal with the perspective or the texture and texture of small objects more finely, making up for the shortcomings of traditional techniques. At the same time, by simulating the visual effects of "thick, light, dry, wet, black" and "chap, rub, dot, dye", digital ink and wash animation can realize ink and wash on the screen without pen and paper, which not only inherits the aesthetic characteristics of traditional ink and wash painting, but also innovatively ADAPTS to the display form of modern digital media. Through these methods, the combination of traditional techniques and modern digital technologies of ink painting not only inherits Chinese history and culture, but also promotes the cross-cultural dissemination and popularization, and rejuvenates the traditional art form. Ink animation is associated with the traditional Chinese ink painting art form of the 1950s. Drawing inspiration and techniques from traditional ink painting and incorporating elements such as poetry, books, paintings and prints, ink animation at that time created a new visual and aesthetic experience. This art form not only inherits the artistic conception, ink, rhythm and other characteristics of Chinese ink painting, but also makes innovations in dynamic display and emotional expression. For example,

the unique charm and mysterious color shown in works such as Little Tadpole looking for her mother has updated Chinese people's concept of ink animation and opened up a new way for the development of this art form. (Lijun, 2023)

Chinese traditional cultural elements are the source of animation creation, animation creation is a process of combination of thought and practice, this process is the creator of the event through personal experience and experience, so as to use these experiences image. The sound and image form a complete work, which is also the embodiment and expression of the creator's thinking form, thus forming a kind of artistic work. The animation "Journey to the West" refines and enriches the content of the original work, transfers the theme characters and complexes to the new script, and plays the role of Chinese traditional cultural elements. In addition, Chinese traditional cultural elements make animation humanistic and artistic. For a long time, Chinese film and television circles attach great importance to Chinese traditional cultural elements, and many film studios and schools have animation. Puppet and paper-cutting departments, the school has drama and other majors, which are the inheritance and application of traditional arts. (Zhiyun&Yang, 2015)

The use of traditional Chinese artistic elements in animation creation mainly has the following forms of expression:

1. The artistic elements of traditional music in local animation. Music has always been an important way to describe stories and choose emotions since ancient times, and Chinese traditional music is no exception. It takes the plot of the story as the material, uses different instruments and music scores to compile the music to depict the characters, and then selects the emotion of the author. In Chinese animation art, traditional music art mainly includes court music, religious music, literati music and folk music, which promotes the development of Chinese local animation business. In the early stage, traditional music was relatively simple in terms of element composition, and then, in the process of its development, other instruments and elements were slowly blended to make the expression of the story plot more real and full. In the creation of traditional music art, there were both guqin skills in "Landscape Situation" and opera art in "Disturbance in Heaven Palace". More "Erquan reflecting the moon" erhu solo and later added the piano solo performance form, fully embodies the diversity and complexity of traditional music art in our country, the production of these music, performance of the tranquility of Taoism and Confucianism at that time a hundred flowers blossom, adding music in the animation, is an important form of Chinese traditional music, and the content of the animation, theme, The matching of the characters' personalities can truly show the three-

dimensional sense of the animation and increase the vitality and appeal of the animation.(Zhiyun&Yang, 2015)

2. The traditional painting art elements in the local animation, the ancient people of our country already had the concrete expression of things image and emotion in the art and painting, and also expressed the living situation at that time through pictures, primitive religion and totem worship are the important source of thought for people's art and painting. For example, in the picture "Hunting Deer" in the Yin Shan rock painting more than 10,000 years ago, the image of the deer is depicted vividly. There are several arrows on the deer, but it still stands, expressing the in yielding spirit and heroism of ancient people. In the contemporary painting art, the traditional Chinese painting art is deeply rooted, which directly affects the development of the whole painting history. Whether it is the prints of Shun Yu period, or the ink paintings of Tang and Song dynasties and modern animation, they are all based on the elements of traditional Chinese painting. (Zhiyun&Yang, 2015)

3. Elements of traditional dramatic art in local animation. Drama is an important part of local animation and artistic expression form, its main characteristics are virtual and procedural, art, music, dance, text integration, to describe the characters and feelings of the choice, in most of the dramatic arts, including the types of winter and winter, Song and Yuan dynasties Southern opera, Ming and Qing dynasties legend and contemporary Beijing Opera. It is the result of its development. In these plays, most of the forms are similar, but the plays in different periods show the emptiness in different periods. The differences of base cities and living habits show different characteristics, thus forming a distinctive drama form in winter. (Zhiyun&Yang, 2015)

The expression method of traditional Chinese artistic elements in animation creation is as follows:

1. Integrated creation of graphics. From scratch, in Chinese animation art, the traditional artistic elements were originally pictures formed by people's imagination, such as the totems of the dragon and the Phoenix dance. These two fictional images, whether in the early era of human development, or in the prosperous Sui and Tang Dynasties, or even today's development of modern civilization, these two vivid images are deeply engraved in people's minds, which are the symbol of the spirit of the Chinese nation and express people's imagination of beautiful things and spiritual strength. From ancient times to the present, countless liberators and scholars have continuously modified the dragon wind, and more dragon images such as "finishing point" and "flying dragon in the sky" have appeared. The phoenix becomes another totem symbol of the Chinese nation, which is another magical color legend image of

traditional Chinese elements. The image of the dragon and the phoenix is just a virtual picture, but its image is deeply engraved in the traditional elements of Chinese history. It is not only the aesthetic of ancient human beings to art. At the same time, it is also the embodiment of the concept and consciousness of the Chinese nation and condenses the overall will and indomitable spirit of the Chinese nation.

2. From concrete to abstract forms of beauty, good design creativity in modern times is inseparable from contemporary knowledge level and science and technology. In ancient times, people only created simple pictures through rational thinking and cognition of nature, and the pictures at this time were inseparable from design and actual use, which directly reflected people's aesthetics at that time. "Art" and "skill" are fully combined to promote the development of social productivity. In contemporary times, people can attach their own thoughts to things through imagination and thinking according to modern science and technology, to better reflect the beauty of things.

Peking Opera is a unique art form in China, which is the quintessence of Chinese culture. It has the characteristics of virtualization. It is flexible in the processing of stage and space. The work "Three Monks", whether in the processing of the scene, or in the shape of the characters, just use a simple and vivid way of expression, it reflects the character characteristics of the characters. At the same time, there is no complex scene set on the painting, but it makes people feel like they are in the scene. For example, in the processing of the temple and landscape painting, a menorah and a shrine are used to show the space of the temple hall. The sun moves from the foot of the mountain to the top of the mountain and then to the foot of the mountain, which shows the easy understanding of the time of a day by using a few secret clocks, fully embodies the imagination and creativity in the art of traditional Chinese opera, and successfully transplanted to the animation works. (Zhiyun&Yang, 2015)

Monkey King: Hero is Back another classic work of the current Chinese domestic animation, which makes use of the Chinese classic films Journey to the West and Uproar in Heaven. The theme of "Monkey King" combines traditional Chinese puppet elements, paper-cut elements and ink elements, and uses the artistic elements of "cute baby" in Chinese folk paintings to shape the images of River and silly girl. Different from other films, Monkey King: Monkey King is Back has made modifications in the face design of Sun Wukong. In previous works, Sun Wukong has a round face or a crescent face. This work uses traditional Chinese elements to show Sun Wukong with a horse face, which can better reflect the cynical and awesome characteristics of Sun Wukong. The addition of these elements makes the animation

of the film more aesthetic and humorous. It is equipped with a wonderful singing section of Peking Opera, which reflects the national color of the film. Peking Opera is thought-provoking, rich in flavor and expressive in form, which leaves a deep impression on people and makes the once declining Chinese animation see the hope of revival. (Zhiyun&Yang, 2015)

In addition, it can also be found in the data survey that integrating traditional elements into digital animation works can also broaden the audience of the works. The age distribution of its audience has gradually reflected the transition from "young" to "young", and the "post-80s" and "post-90s" generation who grew up with animation have become the most important movie-going crowd in China. Among them, *Monkey King: Hero Is Back*, which tops the box office, uses the nostalgia complex of *Journey to the West*, the extensive influence of the national hero Sun Wukong, and the excellent production and visual effects to attract many young audiences to the cinema, among which the audience aged 20-29 accounts for 66.83%. In the current reality that there is no clear classification policy in our country, animation still relies on the different needs of the audience for focus communication on the network platform. A research institute in Shanghai, referring to the American children's film and television drama grading standards, based on the age and development characteristics of children, launched the first domestic folk grading system, which shows the strong demand for diversified digital animation content of traditional elements. In the situation of the diversification of animation media and content, adding traditional elements to digital animation creation should be the general trend. (Geng, 2017)



Figure 7 *Journey to the West: Monkey King is Back*

Source: Tencent Video

To sum up, the use of traditional elements can enhance the cultural connotation and artistic value of animation works. Through the combination of traditional elements and modern animation technology, animation works can have more characteristics and personality and meet the audience's pursuit of cultural heritage and aesthetic needs. And it can improve the appreciation and communication of animation works. Audiences have a strong interest and sense of identity for traditional culture. Integrating traditional elements into animation works can attract more audience attention and love and improve the communication power of works. For example, the series of Chinese Mysteries shows the integration of traditional cultural elements and modern creative methods. These works not only inherit the traditional artistic style of classics such as Magic Brush Maliang, but also use traditional techniques such as ink painting and paper cutting and combine modern animation techniques to creatively present traditional Chinese stories. This combination reflects the harmonious coexistence of tradition and modernity and shows the flexibility and adaptability of traditional Chinese culture. Through this method, the creators not only retain the spiritual core of traditional culture, but also give it a new significance of The Times, making these works not only have cultural heritage, but also meet the aesthetic needs of modern audiences. In general, this kind of animation works is the modern reconstruction of traditional cultural symbols, which not only shows the fresh power of traditional culture, but also provides a new direction and inspiration for domestic animation creation.

2.2.2 Linear narrative and artistic expression in animation creation

The utilization of the hero's journey and metaphor in Pixar animations profoundly influences narrative and plot structures. Research indicates that a conceptual overarching metaphor can generate multiple creative metaphors, which thread through the entire story, forming an interconnected network. These creative metaphors are categorized into three types: supportive metaphors, action-forming metaphors, and disruptive metaphors. Supportive metaphors exert significant influence on character development and world-building but do not directly alter the story structure; action-forming metaphors constrain specific actions the hero must undertake, while disruptive metaphors substitute external forces for key hero actions. These metaphors not only enhance thematic consistency in the narrative but also significantly impact plot structure, character development, focalization, and coherence, demonstrating the preservation and application of the hero's journey framework in Pixar animations and further affirming the central role of metaphor in animated storytelling.

Prokhorov's research analyzed three feature-length and five short Pixar animated films, examining the use of metaphor within the animations and its impact on narrative and plot structure. While specific film titles were not mentioned in the text, the focus of the study lies in elucidating how thematic coherence in animated film narratives is achieved through the employment of metaphor. Prokhorov reveals through the analysis of these films how they construct around a conceptual overarching metaphor, thereby generating a series of interrelated creative metaphors that influence the narrative and plot structure of the films. This study underscores the significance of metaphor employment in animated films and its consequential effects on character development, focal shifts, and narrative coherence (Prokhorov, 2021).

The concept of the monomyth, initially proposed by Joseph Campbell in 1949, delineates a universal pattern comprising 16 stages in the hero's journey. This theoretical framework has significantly impacted the contemporary film industry, particularly through its widespread application in George Lucas's "Star Wars" trilogy and Christopher Vogler's research. Campbell's monomyth not only delineates the character of the hero but also establishes a structural framework for their journey. While the monomyth structure in certain films may appear incomplete or altered due to external interventions, adept utilization can still construct disruptive metaphors within traditional narrative structures, thus retaining the framework of the monomyth. This utilization of structure and metaphor has wielded significant influence on modern film production and narrative analysis, rendering the monomyth a crucial tool in the study and creation of cinematic narratives (Prokhorov, 2021).



Figure 8 Still from Two's Accompany

Source: (Brian Phinn, 2020)

Brian Finn created the animated short film "Companionship" to explore the themes of acceptance and understanding of different cultures. He utilized animation as

an art form capable of transcending cultural barriers, narrating the stories of two protagonists, Philip and Aria, who respectively adore neo-classical music and bebop jazz. Through their encounter and interaction, Finn demonstrates that music serves as a universal language, capable of assisting individuals in bridging cultural and ideological divides, finding common ground, and mutual understanding. Finn believes that by sharing interests and fostering healthy relationships based on respect and understanding, acceptance and collaboration among people from different backgrounds can be promoted. His work emphasizes animation as an effective medium for conveying abstract concepts and facilitating cross-cultural communication, while also reflecting the influence of personal experiences and beliefs on the creative process (Phinn, 2020).

Since entering the new century, along with the popularization of the Internet and the development of digital technology, Chinese animation creation has entered a brand-new stage. Thanks to the strong support of national policies and the continuous exploration of animation creators, the domestic animation industry has become more and more prosperous. Along with the popularization of the Internet and the rise of video websites, the creation of Chinese animation has entered a brand-new stage, which also provides animation creators with a broad creative space and the animation industry with a new way of development. The improvement in marketization and the huge national cultural entertainment demand prompted capital to enter the animation industry, which further promoted the development of China's animation industry. Domestic animation has been transformed towards diversification, which has led to the formation of an animation creation style with Chinese characteristics in terms of narrative style and artistic expression. Figure 9 shows the linear narrative and artistic expression of domestic animation creation features. (Xia&Tirakoat,2024)

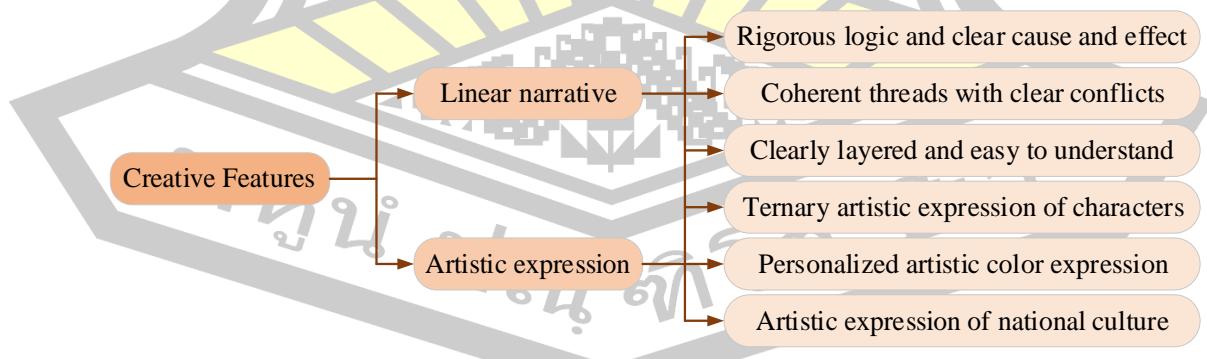


Figure 9 Linear Narrative and Artistic Expression in Animation Creation

Source: (Xia&Tirakoat,2024)

During more than 100 years of development, Chinese animation creation has experienced from silent to sound, from black and white to color, from hand-drawn drawings to computer drawings, and has gone through a period of difficult start, vigorous development, downturn cold period and recovery challenge period. Domestic animated films with linear narrative as the main narrative means are precisely one of the most suitable narrative methods for Chinese animated films that have been worked out by countless animators during this century. Through the progressive narrative means, the connotation of the animated movie is deeply analyzed so that the audience can understand the ideas conveyed by the animated movie more thoroughly. (Xia&Tirakoat,2024)

In the survey data on Figure 10 "what factors will the audience like an animation", in addition to the interesting story has become the most selected factor, the demand for the picture and the painting style has also become a comparable choice factor. In the era of media integration, intuitively the first impression of the animation screen effect will become an important factor whether the animation can be loved by the audience. Liking characters and liking beautiful music also become important criteria. However, the internal judgment factors such as ideological connotation, creativity and production, which were once in an important position, have not become the main choice of the audience today. In addition, in the survey data of "what factors will the audience dislike an animation", the idea that the story is vulgar, and shallow becomes the biggest aversion factor, followed by the vulgar and boring plot. The degree of liking and disliking for the painting style and characters has also become an important criterion. Today's animation audiences pay more attention to the more intuitive factors such as story, painting style, plot and music, and pay less attention to the content that needs to be considered, such as the ideological connotation of the story, production and creativity. (Geng, 2017)

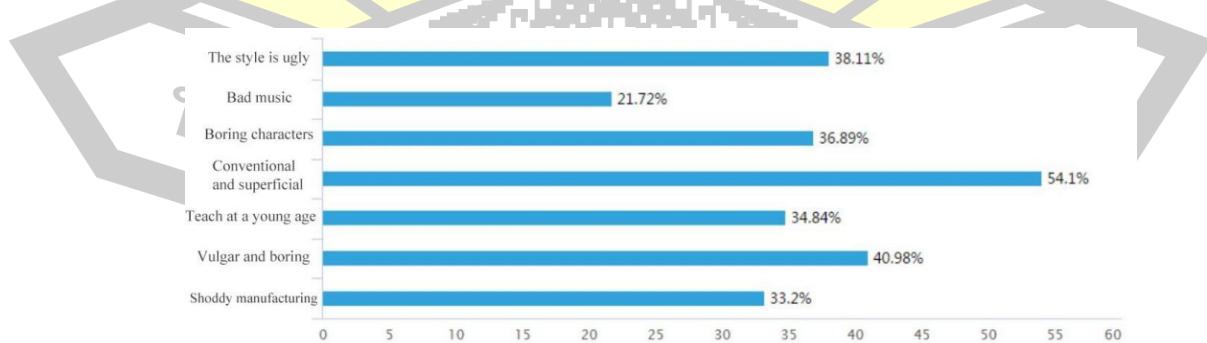


Figure 10 Factors that make audiences like an animation.

Source: (Geng, 2017)

The importance of humanistic attributes of animated films lies in the profound expression and discussion of human emotions and common problems through unbounded creative art forms. They transcend the limits of reality and create emotional Bridges that connect the audience's heart, trigger resonance and trigger thinking through imaginative visual language. This expression of humanistic care not only improves the artistic level of animation works, but also gives the audience the opportunity to self-reflect and emotional enlightenment in the aesthetic experience. Therefore, the humanistic spirit in animated films is not only a visual enjoyment, but also an important way of spiritual communication and exchange. (Dong, 2022)

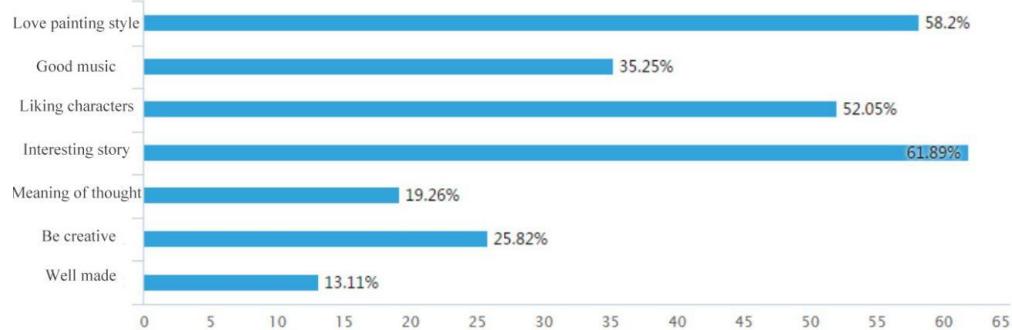


Figure 11 Factors that make audiences dislike an animation.

Source: (Geng, 2017)

The theoretical switch between "free style poetry animation" and "prose poetry animation" reflects the innovation of contemporary animation in creative methods and narrative methods. "Free verse animation" emphasizes the director's subjective creation and endows the animation with artistry and experimentation through the logic and structure of the poem, while "prose verse animation" emphasizes the emotional depth of the story and the delicate characterization of the role, adopts more objective and traditional narrative techniques, and emphasizes the emotional resonance between the story and the audience. Although they develop separately in animation creation, they jointly explore poetic expression, an artistic pursuit to present the beauty and deep meaning of poetry through animation. In short, these two theoretical turns show different understanding and practice paths for the poetic expression of animation and realize the diversification of emotional and artistic expression in the creation. (Dong, 2022)

Poetic narration in the animation through poetic symbol, poetic structure and poetic lens language, deep dig into the hearts and emotions of the characters. Instead of linear narration, it uses symbolism and implication to construct artistic conception, so that the audience can realize inner resonance through perceiving the psychological

activities and emotional states of the characters. Delicate brushstrokes depict universal human emotions, such as family, friendship and love, without over-rendering, and strive to be true, so that the audience can have empathy in the natural expression of emotions. Through the natural dialogue between the role and the environment, the inside and outside of the camera are integrated, and the deep dialogue between the subject of "I-you" is established, to realize the psychological link and spiritual resonance between the audience and the role. (Dong, 2022)

Then develop to today's production era, the intervention of AI artificial intelligence technology makes digital animation production more possible. Artists have used virtual reality technology to improve the human-computer interaction performance of animation works under virtual reality technology. VR technology, through its immersive characteristics, enables the audience to participate in the interaction in the animation from the first perspective, from "watching" to "being present", and adds interactive feedback in the animation production process, so that the audience can interact realistically in the virtual environment. In addition, artists are aware of the importance of gesture interaction, including static gesture recognition and dynamic gesture recognition. The authors pointed out that moving from manual feature extraction methods to convolutional neural network feature recognition methods can improve the effect of gesture interaction. In summary, by combining VR technology with gesture interaction, the human-computer interaction performance of animation works under virtual reality technology can be improved. This means that the audience can better interact with the work when using VR animation, participate in the development of the plot, and improve the interactive ability of the work. This is of great significance for the development of VR animation and the improvement of people's artistic life quality. (Liu&Pan, 2022)

In the long development process of Chinese animation, a unique style of "calligraphy animation" has appeared. The difference between calligraphy animation and traditional calligraphy art is its dynamic and multimedia expression. Traditional calligraphy focuses on static aesthetic expression and ink charm, while calligraphy animation transforms the lines and structures of calligraphy into images that can be dynamically interpreted, giving characters a sense of dynamic beauty and rhythm. This art form expands the performance boundaries of calligraphy, making it not limited to paper, but presented on the screen in the form of animation, bringing a new visual and sensory experience to the audience. Calligraphy animation has a broad prospect, because it not only inherits the cultural heritage of thousands of years in China, but also combines modern animation technology, which can cross time and space for cultural exchange with a wider audience. Its creative methods are open and

diverse, and it can not only create a single school of calligraphy, but also integrate a variety of methods to produce a rich variety of works. In addition, calligraphy animation provides a new exploration platform for artistic language and design concepts, which can more vividly convey humanistic spirit and emotion. Therefore, calligraphy animation is not only the product of artistic innovation, but also the unique voice of Chinese animation on the world stage, which has far-reaching cultural significance and development potential. (Yanmei, 2011)

The main difficulties of calligraphy animation in the experimental stage mainly include the following aspects:

1. Concept change: The core of calligraphy animation is not just the combination of technology, but to understand and creatively express the combination of calligraphy and animation. It is necessary to start from the meaning and form of traditional calligraphy and endow it with richer dynamic expression and connotation.

2. The definition of hieroglyphics and visual calligraphy: in traditional Chinese culture, the boundary between hieroglyphics and calligraphy art is fuzzy. Calligraphy animation needs to visualize abstract calligraphy symbols while maintaining the charm of calligraphy, which is a complex creative and theoretical problem.

3. The distinction between calligraphy animation and animation calligraphy: it is the key to define the concepts and categories of calligraphy animation and animation calligraphy. Calligraphy animation is not only about dynamic calligraphy display, but also about making calligraphy the subject of expressing stories and emotions, not just a supporting role or foil.

4. The integration of technology and art: In terms of technology, how to use modern animation technology to dynamically show the characteristics of line thickness, density, dry and wet, light and light of calligraphy, as well as the charm of ink is a big challenge. At the same time, this is also a kind of artistic exploration, to innovate based on traditional culture, to convey profound humanistic feelings.

In general, calligraphy animation faces multiple challenges in the experimental stage, such as concept, definition, technology and art integration, and these difficulties are also the key to its development and innovation. (Yanmei, 2011)

Calligraphy animation is a new form of animation, which combines traditional calligraphy art with modern animation technology. In the experimental stage, the production of calligraphy animation mainly focuses on several aspects:

1. Artistic integration: Calligraphy animation is not only about inserting calligraphy elements into the animation, but also about integrating the charm of calligraphy and the dynamic effect of animation to form a unique artistic style.

2. The balance between image and symbol: it is necessary to distinguish between visual symbols and symbolic images to ensure that the artistry of calligraphy and the expressiveness of animation complement each other.

3. Technical exploration: At the technical level, the production of calligraphy animation needs to explore how to use animation technology to effectively show the thickness, density, dry and wet, light and other characteristics of calligraphy lines, and how to express the rhythm and dynamic beauty of calligraphy.

4. Artistic conception expression: the creation of calligraphy animation is not only a technical challenge, but also an exploration and expression of the deep artistic conception of calligraphy art.

5. Practice and Summary: Since calligraphy animation is still in the experimental stage, the production method needs to be explored and summarized in constant practice, to find the most suitable way to express this art form. (Yanmei, 2011)

Calligraphy animation is an innovative form that integrates traditional Chinese calligraphy art and modern animation technology. It stems from the profound culture of Chinese characters, which are not only the carrier of Chinese culture, but also an important element of artistic expression. In calligraphy animation, the shape and structure of Chinese characters are transformed into dynamic visual language, and rich emotions and profound humanistic spirit are expressed through the changes of the thickness, density, dryness and wetness of the calligraphy lines. The core of calligraphy animation is to give static calligraphy works dynamic life, so that each stroke and stroke are full of movement and rhythm, to convey more vivid emotions and artistic conception. It breaks through the limitation of traditional calligraphy that only "represents meaning". Through the visual symbols and symbolic images, calligraphy is not only a display of words, but also an artistic language that can touch people's hearts. In addition, the creation of calligraphy animation is not restricted to any school or technique, and you can freely use different calligraphy styles and styles to create unique calligraphy animation works. This art form not only carries forward the traditional Chinese culture, but also injects new vitality and creativity into the modern animation art, making it an important way to convey the Chinese humanistic spirit and emotion. (Yanmei, 2011)

To sum up, animation, as a comprehensive art, has obvious differences between its narrative characteristics and literary narrative and film narrative. To better attract and impress audiences, animation creators need to constantly explore and innovate to combine multiple narrative techniques to tell compelling stories. Although linear narrative is the most basic narrative method in animation, with the change of

audience's aesthetic needs, modern animation creation is more and more inclined to use nonlinear narrative method, which often involves the interweaving and mutual penetration of two or more space-time. This diversified narrative method not only enriches the performance style of the animation, but also encourages the audience to interpret the deep meaning behind the work as a whole. The core elements of narrative art of film and television animation include narrative elements, structure and style. These elements interweave and influence each other to determine the quality and appeal of the work. At the same time, "narrative of animation" is also regarded as a kind of "narrative", which is also applicable to the classical narrate concept in literary theory but has a unique presentation way of the medium.

2.2.3 Digital animation production technology

The difference between traditional hand-drawn animation and digital animation is mainly reflected in the creation process and the use of tools. Hand-drawn animation emphasizes personalized brushstrokes and artistic styles. Each frame of animation needs to be hand-drawn by the artist, which shows the unique style and artistic perspective of the author, but this process is time-consuming and costly. Digital animation is based on computer technology, with the help of computer software and hardware, through modeling, mapping, motion capture and other technologies to achieve the construction of characters and scenes, high efficiency, easy to modify, relatively low cost. In addition, the lighting and texture effects of 3D animation can be accurately controlled by technical means, which is more realistic than hand-drawn animation. In general, hand-drawn animation reflects more characteristics of manual art, while digital animation shows the advantages of technology and technological progress. (Caishu, 2023)

The introduction of digital media technology into modern animation design and production is considered an innovative design concept and method, primarily due to its significant optimization of creative efficiency and the quality of works. The application of this technology has facilitated the transition of animation production from traditional hand-drawing to utilizing high-tech means such as 3D modeling and virtual reality, thereby greatly expanding the expressive capabilities and application scope of animation. Digital media technology provides a richer array of creative tools, such as 3ds Max, Photoshop, and Flash. These tools not only accelerate the processes of character modeling and scene creation but also enhance the vividness of animated characters and the realism of scenes. Furthermore, the application of digital media technology also supports the commercial value of animated works by enhancing the technical content and artistic expression of the works, attracting a larger audience and market demand. Therefore, the introduction of digital media technology represents a

major innovation in the field of modern animation design and production, not only driving technological upgrades in the animation industry but also opening up new possibilities for artistic creation (Jiang, Wang, Tsai, & Ma, 2022).

The application of digital media technology in the design of film and television animation not only optimizes creative efficiency and quality but also promotes the innovative development of animation art forms, opening up vast development space for the future of the animation industry. This is mainly manifested in the following aspects:

1. Diversity and Innovation: The introduction of digital media technology provides rich expressive forms and innovative tools for animation design, making animation content more diverse and capable of achieving effects that are difficult to realize with traditional hand-drawing.
2. Efficiency Improvement: Through techniques such as 3D animation design and virtual simulation, digital media technology greatly improves the efficiency of animation production, supporting large-scale and efficient animation creation and production.
3. Integration of Art and Technology: Combining artistic spirit with high-tech means, digital media technology promotes the innovation of artistic forms, bringing new artistic expressions and creative characteristics to animation design.
4. Enhancement of Commercial Value: The application of digital media technology enhances the commercial value of animated products, bringing new business opportunities to the animation industry and effectively realizing the economic benefits of animated products (Jiang, Wang, Tsai, & Ma, 2022).

Digital animation first went through the 2-D animation stage produced by single-line flat painting technology. With its unique painting style and expressiveness, single-line flat 2D animation has become an important form of artistic expression. It emphasizes the importance of contours through simple lines and block surface colors and creates rich visual effects and a sense of flow by using the combination of line changes and color blocks. This method of animation does not rely on the physical rules of the real world, allowing shapes and objects to freely deform, breaking the boundaries of conventional visual perception. In dynamic changes, contour displacements and morphological changes both convey the rhythm of the movement and construct the visual experience of the audience, stimulating the meaning composition of the audience's cognition. With its simple and powerful visual language, single-line flat 2D animation provides the audience with a kind of animation art form that surpasses the traditional and has great expressive force. (Chuchu, 2022)

The two-dimensional animation of single-line flat painting shows a kind of artistic expression form closer to painting language through simple lines and color planes. Its characteristics are that the contour lines clearly identify the internal structure and external boundaries of the object and can be flexibly deformed without following the restrictions of physical laws, which makes the animation can freely transform the shape and break the inherent sense of space. Compared with real images and 3D modeling animation, it can highlight the unity of form and connotation through simplification, combination, abstraction and separation of images, and show different meaning structures. In addition, the deformation of 2D animation enhances the dynamism and continuity of the picture, so that the audience can distinguish the meaning of different visual images at the cognitive level and strengthen the hierarchy of visual cognition and the selectivity of visual information. In animated narrative, 2D animation focuses more on the integration of form and motion, emphasizing visual circulation and perceived geomorphism. (Chuchu, 2022)

With the advancement of digital technology, a paperless animation creation mode has emerged for digital animation. For instance, the production process of 2.5D character creation and rigging is facilitated through software such as ToonBoom Harmony. The 2.5D animation technique, also known as pseudo-3D animation, imbues two-dimensional images with a sense of depth, giving them the appearance of being three-dimensional. In ToonBoom Harmony, the character's various parts (such as limbs) are segmented and overlapped using cut-out animation techniques to simulate the perspective of the character. It is particularly important to avoid adding vertical details around the knees and elbows during design, as this facilitates the simulation of motion illusions during the animation production process (Brander, 2023). The paperless animation production technique offers several advantages:

1. Vector drawing: Vector drawing software is used for paperless drawing, which is easy to modify and output pictures with different formats and pixels. This allows animators to create directly in the computer, eliminating the paper and paint required for traditional animation drawing, which is more environmentally friendly and clean.
2. Improve efficiency: paperless painting can shorten the animation production time, which is of great significance to improve the efficiency of animation creation. Using paperless animation technology, animators can create more quickly, thus improving production efficiency.
3. The combination of lines and color filling: in paperless painting, lines can be covered by colors in the process of filling colors, so that stiff lines are not

displayed in the picture. This combination of lines and color filling improves the quality of the picture and makes the animation smoother and more natural.

4. Digital video documents: paperless paintings exist in digital form, which is easier to spread and read on the Internet. This form of video document has a wider dissemination channel, which makes it more convenient to share and display works.

In summary, paperless animation technology has the advantages of vector drawing, improved efficiency, the combination of line and color filling, and digital video documents. These advantages have made paperless painting the mainstream way of animation production, promoted the development of the animation industry, and strengthened the possibility of dissemination of animation works while improving the production quality and saving costs. (Zheng, 2019)

With the advancement of hardware and digital technology, the field of digital animation has witnessed the emergence of 3D animation, which is more sought after by audiences. Responding to the demands of the times and people's pursuit of sensory stimulation, 3D animation technology, with its three-dimensional visual effects and highly realistic simulation, has the capability to create scenes and characters that closely resemble the real world, allowing viewers to immerse themselves more deeply in the story. Furthermore, the flexibility and creativity of 3D animation enable creators to surpass the limitations of traditional 2D animation, achieving richer and more nuanced visual effects. As technology continues to progress, 3D animation is not only used in film and television production but also widely applied in areas such as gaming and virtual reality, satisfying people's desire for fresh experiences and high-quality entertainment. Despite the time-consuming nature and high costs associated with 3D animation production, its profound impression and strong visual impact make it an indispensable part of the animation industry today.

The fundamental difference between 2D animation and 3D animation primarily lies in spatial dimensions and production processes. 2D animation is flat, created through frame-by-frame drawing to produce animation effects, where backgrounds are typically static, and character actions are achieved through overlay techniques, providing a simplistic yet engaging visual experience. In contrast, 3D animation is crafted in three-dimensional space, offering a more realistic and dimensional visual effect by simulating real-world lighting, shadows, and textures to create richer and more intricate scenes and characters. The production of 3D animation involves complex processes such as modeling, texture mapping, lighting, and rendering, thus typically being more costly and time-consuming compared to 2D animation. In summary, 2D animation attracts audiences with its simplicity and

artistic style, while 3D animation dominates the visual field with its realistic three-dimensional effects and detailed rendering.

2D animation and 3D animation each have their own unique advantages and disadvantages in terms of commercial value and cultural dissemination. 2D animation, with its intuitiveness and ability to attract children's attention, plays an irreplaceable role in cultural education and artistic enlightenment. Its relatively low production cost makes it accessible for individual creators and small teams. However, 2D animation may not match the three-dimensional and realistic visual effects of 3D animation. Leveraging technological advancements, 3D animation can provide more realistic spatial perception and dynamic effects. It holds unique commercial value for projects seeking visual impact and physical realism. It can create immersive viewing experiences, particularly suitable for high-quality film and game development. However, 3D animation entails higher production costs and time consumption, requiring strong financial support. In summary, 2D animation excels in cultural dissemination and artistic education, while 3D animation dominates in providing immersive experiences and high-quality visual effects. Both have their merits, and future development will likely witness more integration and mutual learning between the two. (Du, 2021)

In the context of digital media, the production of Chinese animation films highlights the importance of 3D animation technology because of the guiding role of the box office of commercial animation films. This is mainly reflected in the following aspects:

1. Computer generation technology: The core of 3D animation is computer generation technology, which includes complex mathematical modeling and computer programming. The development and application of these technologies have greatly improved the production efficiency and visual effects of animated films.
2. Graphics processing and display technology: modern 3D animation relies on advanced graphics processing technology and display technology, which makes the image of the animated movie more abundant, more dynamic and smoother, and improves the reality and enjoyment of the movie.
3. Software technology: 3D animation production relies on professional computer software, which can assist animators to achieve more detailed and complex animation effects and support rapid iteration and improvement of animation.
4. Artificial intelligence: Artificial intelligence is more and more widely used in 3D animation production, which can assist animators to create more intelligently, reduce production costs, and improve the creativity and quality of animation works. (Caishu, 2023)

The animated film Deep Sea is a fascinating work, loved by director Tian Xiaopeng and audiences. The film is not only a continuation of its predecessor, Monkey King: Hero Is Back, but also a remarkable development in narrative and technology. The story of "Deep Sea" revolves around the theme of "saving the children", to explore the spiritual characteristics of the current era. On a technical level, the film pioneered the use of particle ink animation techniques to create unique and impressive visual effects. (Junlei, 2023)



Figure 12 Animated film Deep Sea

Source: Tencent Video

At the same time, Deep Sea has made powerful expansion in the technology of particle ink animation production, which is mainly reflected in three aspects: first, the combination of highly painterly hand-drawn maps and models creates a colorful and flowing rendering effect; Second, the color ink map is projected onto the particle model by means of projection to achieve the color dragging effect in the blur motion. The third is to use the particle system to simulate the traditional ink-wash effect, presenting the advantages of two-dimensional animation in three-dimensional space. These innovations not only enhance the visual impact of the animation, but also open a new path for the production technology of particle ink and wash animation. But at the same time, Deep Sea also faces challenges such as how to better integrate particle ink design with character behavior and story narration, and how to more vividly represent the depth of the deep sea in the visual space. (Junlei, 2023)

In 2020, Steven Murdoch identified several constraints facing knowledge exchange in three-dimensional computer-assisted character animation primarily

comprising insufficient transmission of deep artistic and procedural knowledge, alongside a lack of effective methods to make this knowledge lucid and shareable to emerging professionals and non-specialist audiences. Despite the increasing complexity of technology, progress in clearly conveying the profound knowledge and procedures of character animation practice has been limited. Moreover, there is a lack of evidence-based research in this field, along with a deficiency in methods supporting researcher-practitioner interaction, highlighting the gap between the knowledge and practices of experienced character animators in three-dimensional computer-assisted character animation production and how emerging animation professionals engage with and acquire such knowledge and practices. Furthermore, existing communication methods such as apprenticeships, textbooks like "How to Make Animation," and procedural models often either avoid explicit processes and language, lack depth and specificity, or are presented from perspectives biased towards artistic, technical, or managerial audiences (Murdoch, 2021).

In the midst of the rapid development of 3D animation digital technology, the emergence of motion capture technology has greatly facilitated animation production. Motion capture technology offers the potential to translate real movements into animation, thereby enhancing the authenticity and expressiveness of animations. Its applications extend beyond movies and video games to various IT infrastructure applications, further enhancing the accuracy and efficiency of motion capture data processing with the aid of machine learning algorithms. However, the integration of this technology also faces multiple challenges such as high costs, resource requirements, and compatibility issues with animation software. Additionally, despite the development of advanced motion capture sensors and improvements in algorithms which can enhance data quality, challenges related to errors and resolution limitations in capturing subtle movements persist. Therefore, the future development of motion capture technology requires addressing these challenges to realize broader applications and innovations. The potential of algorithms in understanding human motion and enhancing motion capture technology is evident in several key aspects. Firstly, through deep learning and machine learning algorithms, it is possible to learn from large-scale datasets and better represent human movements, crucial for improving the accuracy and processing efficiency of motion capture data. These algorithms can analyze complex motion patterns, identify movements in different contexts, thereby enhancing the system's ability to recognize motion in virtual environments or the real world. Secondly, algorithms can assist in understanding the synchronization issues between motion data and 3D models, thereby automating and improving the accuracy and efficiency of the synchronization process. Furthermore,

the integration of context-aware techniques can enhance the system's ability to recognize actions in different situations, further unlocking the potential of motion capture technology. In conclusion, algorithms not only improve the accuracy and efficiency of motion capture technology but also drive further development of motion capture technology in 3D animation production, contributing to the overall development of the 3D animation industry (Wibowo, Nugroho, & Wibowo, 2024).

Then develop to today's production era, the intervention of AI artificial intelligence technology makes digital animation production more possible. Artists have used virtual reality technology to improve the human-computer interaction performance of animation works under virtual reality technology. VR technology, through its immersive characteristics, enables the audience to participate in the interaction in the animation from the first perspective, from "watching" to "being present", and adds interactive feedback in the animation production process, so that the audience can interact realistically in the virtual environment. In addition, artists are aware of the importance of gesture interaction, including static gesture recognition and dynamic gesture recognition. The authors pointed out that moving from manual feature extraction methods to convolutional neural network feature recognition methods can improve the effect of gesture interaction. In summary, by combining VR technology with gesture interaction, the human-computer interaction performance of animation works under virtual reality technology can be improved. This means that the audience can better interact with the work when using VR animation, participate in the development of the plot, and improve the interactive ability of the work. This is of great significance for the development of VR animation and the improvement of people's artistic life quality. (Liu&Pan, 2022)

At present, the rapid development of artificial intelligence technology is profoundly affecting the field of art creation. In this era of intelligence, the characteristics of art creation are first reflected in the intelligence of creation tools. Modern tools are capable of not only sensing, but also making autonomous decisions and even learning and simulating human emotions. Secondly, the content generated by the machine provides rich materials for artists and improves the creation efficiency. In addition, the model of human-machine collaboration is also emerging, where the strengths of humans and machines complement each other and jointly promote the growth of creators and tools. Finally, the trend of the fusion of virtual and real is becoming increasingly obvious, from the fusion of virtual and real scenes to the fusion of virtual characters and real people, which frequently appear in contemporary art. Facing the challenges posed by AI requires the thoughtful consideration of each of us and the joint efforts of all sectors of society. (Liqun, 2023)

The remarkable characteristics of artificial intelligence in art creation are mainly reflected in four aspects. First, the intelligence of the creation tool is that the tool not only has the ability of perception, but also can make independent decisions and acquire knowledge. Secondly, the creation content generation, through technical means can instantly produce a variety of art materials; Thirdly, the human-computer collaboration of the creation process, artists and AI participate in the creation task together, and each gives full play to its unique advantages. Finally, the fusion of virtual and real roles, that is, the addition of AI is blurring the boundaries between artistic creators and technical workers. These characteristics jointly promote the development of art creation towards more efficient, personalized and intelligent direction. Human-machine collaboration mode embodies the combination of human creativity and machine executive ability in artistic creation. Artists are responsible for creative work such as planning, decision-making and top-level design, while AI quickly generates materials and ideas to provide novel artistic ideas by learning the rules of human creation. In this process, human artists and AI tools complement each other and jointly participate in the creative process, increasing efficiency, reducing costs, and promoting innovation. Artists still hold the core creative power, and AI provides supplementary creativity, and this collaboration model promotes diversity and innovation in art. (Liqun, 2023)

The challenges of art creation in the era of artificial intelligence mainly include:

1. Ethics and copyright: AI-generated art involves issues of originality and copyright ownership, which poses challenges to existing copyright laws.
2. Human-computer creation boundary: define the roles and contributions of artificial intelligence and human artists in the creation process and protect the creative rights of artists.
3. Perception of artistic value: Machine-generated works may change the public's perception of artistic value and aesthetics, leading to changes in artistic evaluation standards.
4. Career transition: AI's efficient creative ability may replace some artistic creation jobs, and practitioners need to adapt to the new technology and explore new work patterns and career paths.
5. Over-reliance on technology: Artists may over-rely on AI tools, compromising creative independence and personalized expression.
6. Social acceptance: The acceptance and recognition of AI art in the traditional art field is also a challenge. (Liqun, 2023)

In summary, these technologies have not only changed the way animated films are made, but also redefined the artistic expression and cultural value of animated films. The continuous update and development of digital animation technology benefits from the powerful push of computer technology and digital technology. Compared with the traditional way of animation production, the digital animation technology under the new media allows the creators to transfer the traditional animation drawing process to the computer through computer hardware and related software and establish a model or scene in the virtual space according to the predetermined shape, size and other parameters to represent the object to be expressed. With the advent of the 5G era, the audience's demand for ultra-high-definition picture quality has been met, so animation production companies and video platforms have begun to provide higher quality works and better services. In addition, new technologies such as XR technology and AI technology have begun to be applied to the animation industry, making domestic animations gradually break the restrictions of traditional production methods and presentation forms. Now the animation experience has developed from a single visual to a more diverse and three-dimensional form, and the production process has also developed from manual repetition to more efficient human-computer interaction.

2.2.4 The changes in digital animation production environment

Animation itself, as a diversified medium, is constantly reinventing itself in the rapid evolution of new technologies and communication ecology. On the one hand, animation absorbs digital technologies, such as 3D modeling, VR, AR, etc., breaking through the limitations of traditional planes, giving the works a sense of space and interactivity, and transforming the audience from a simple receiver to an interactive participant. On the other hand, with the popularity of the Internet and mobile devices, the display and dissemination platform of animation has become diversified, not only limited to film and television, but also extended to the Internet, games, advertising and other fields. Animation has used its flexibility to move through various mediums, synchronizing with changing technological and social needs, redefining its role and meaning in culture, education, entertainment, and more. (Mingming, 2022)

Manuel Hernández-Pérez's research in 2019 on "Global Popularity of Animation" and "Comic Media" emphasizes the significance of animation and comics as transnational and cross-media industries. These industries are not only crucial components of Japanese popular culture but have also successfully attracted highly diverse audiences globally. They demonstrate their central role in transmedia communication through character licensing, transcreation, and the construction of fictional worlds rich in characters and historical narratives. In contrast to other

transnational media conglomerates, comics play a central role in the Japanese media ecosystem, distinguishing them from other industries. Furthermore, the cross-cultural exchange and transnational mobility of animation and comics highlight their transmedia and transcultural characteristics as global popular culture, not merely due to their "Japaneseness" but also their relationship with Japan's visual heritage. The study of these industries demonstrates the maturity of theoretical understanding and explores how to research these media as part of global popular culture, contributing to the development of interdisciplinary projects.

He also criticized the irregular presence of cultural studies in the research of Japanese visual culture, pointing out that although Japanese visual culture industries such as manga and anime have significant cultural and aesthetic influences globally, academic research in these fields has failed to fully integrate the traditions of cultural studies. Despite some important efforts attempting to provide a comprehensive perspective, criticism mainly focuses on the tendency of these studies to limit themselves to the analysis of stylistic features and narrative techniques of the products, while overlooking broader cultural and societal discussions. Additionally, the article argues that manga and anime are perceived as manifestations of cultural commodification, and research on them should be more widely integrated into the traditions of cultural studies to foster a deeper understanding and critical discussion of these media as forms of global popular culture (Hernández-Pérez, 2019).

Animation itself, as a diversified medium, is constantly reinventing itself in the rapid evolution of new technologies and communication ecology. On the one hand, animation absorbs digital technologies, such as 3D modeling, VR, AR, etc., breaking through the limitations of traditional planes, giving the works a sense of space and interactivity, and transforming the audience from a simple receiver to an interactive participant. On the other hand, with the popularity of the Internet and mobile devices, the display and dissemination platform of animation has become diversified, not only limited to film and television, but also extended to the Internet, games, advertising and other fields. Animation has used its flexibility to move through various mediums, synchronizing with changing technological and social needs, redefining its role and meaning in culture, education, entertainment, and more. (Mingming, 2022)

Cholodenko advanced a radical viewpoint, asserting that not only animation constitutes a form of cinema, but that all films — regardless of genre — are fundamentally a form of animation. This argument challenges traditional understandings of the relationship between film and animation, suggesting that film, as a medium, shares the essence of animation, thus redefining the scope of film studies. By theorizing animation, Cholodenko transforms film studies into a

specialized case of animation studies, thereby prompting a reevaluation of both film theory and animation theory. This perspective not only broadens the understanding of animation but also offers new insights into the development of film theory. (Cholodenko, 2022)

The relationship between animation and film far exceeds the conventional categorizations. Animation is not merely a branch of film but constitutes the essence of film itself. All films, whether traditional live-action or modern computer-generated imagery, can essentially be regarded as animation. This is because film production fundamentally involves the continuous movement and alteration of images, aligning closely with the processes involved in animation production. Films originate from animation, and over time, especially with the development of digital cinema, films have essentially evolved into a distinct form of animation. This perspective redefines the boundaries between film and animation, suggesting that the study and theoretical exploration of film should consider animation as one of its core elements, not only due to the use of animation techniques but also because it represents the fundamental characteristics and creative processes of visual culture.

As an art form, animation has a higher dependence on equipment than other arts, and technological progress is indispensable for animation. Thus, even the Figner mirror, invented in 1832, could already convey the coherent motion of a drawn frame-by-frame object to the human visual system. But this backward technology cannot play a very positive role in the dissemination of animation information. It wasn't until 1906, after the invention of film, that animation historians agreed that the world's first animated film recorded on standard film, "Funny Pictures of Funny Faces," was published. After that, the animation and animation that is truly in line with the modern sense and the technological progress were opened. (Baiyi&Li, 2023)

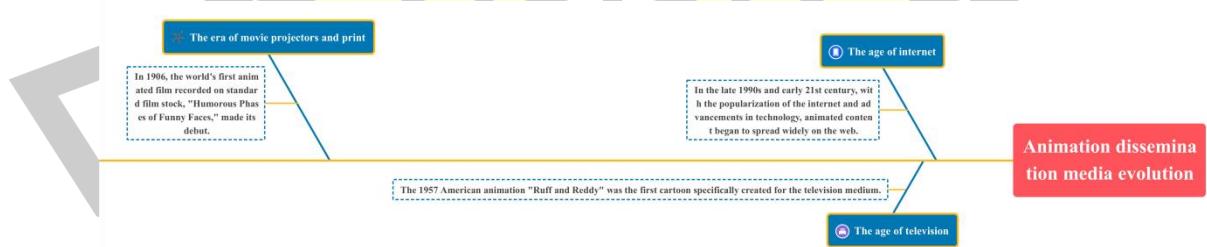


Figure 13 The evolution of animation media.
The spread of information.

1. The era of movie projectors and print

After "Funny Faces", animation began to use new media and became a member of the mass media. Like movies in their early days, animations tended to use

visual symbols such as subtitles and bubble dialogs to compensate for the lack of information completeness caused by the inability to use sound effects.

(1) Sound movies. As a supplement to the picture, the addition of sound makes the transmission and richness of the image and related information rise a step, which not only greatly supplements the integrity of the image information, but also strengthens its expansibility. Therefore, it has been retained as an important part of the image medium. The sound transmission device has also become the necessary device for most video transmission media. For animation, this led to the first sound animation, *Steamboat Willie*. The realization of dubbing makes the unique exaggerated attributes of animation greatly strengthened, and all kinds of wild imagination become more convincing because of the addition of sound effects.

(2) Color films. Color makes the image richer. Color is not as essential as sound. Just as celluloid and pixel styles are popular today, the early black-and-white images caused by technical limitations have also become a retro feeling with a unique style. This also enables the expression of animation to be further expanded. In animation, the addition of sound and color makes the animation media more complete to disseminate information and makes the animation itself more attractive. The high degree of immersion provided by the movie projector and screen has helped the medium evolve to this day. The paper media basically developed into the final form, but the form it carried influenced and extended to other media. There were doubts that the medium of television would ever replace the film projector, and the high degree of immersion that the film projector and the screen provided proved difficult to replace with the medium of television.

2. The age of television

The 1957 American animation *Ralph and Reed* was the first to be created specifically for the medium of television. With the rise and market influence of television, companies began to sell their films to television media, but the considerable income brought by the repeated playback of the products made the television animation in the United States stagnating. The real promotion of television animation, to belong to the 1961 Japanese television animation "Astro Boy". There are both advantages and disadvantages. The whole set of industrial processes from the production committee to the promotion and sales of peripheral products in *Astro Boy* makes the TV animation more standardized, but at the same time, it also leaves behind problems such as the pressing of labor force, excessive commodity attributes and even the crude production for the purpose of selling peripheral products. Today, TV is still the world's most popular media, but the popularity of personal computers and smart mobile terminals has undoubtedly squeezed the living space of TV and TV

media. This kind of animation with high commodity attributes is directly inherited by the Internet communication medium. Based on Internet application technology, with open operating system and chip, and with open application platform, the boundaries between TV and personal computers and intelligent mobile terminals begin to blur. The medium of TV is developing towards the direction of Internet technology. On the one hand, the Internet technology can make information transmission more efficient and accurate. On the other hand, the powerful video and audio functions of emerging intelligent terminals also force TV manufacturers to seek new ways of competition. For TV animation, compatibility with the Internet allows TV animation and related information to be spread in a more diverse way, without being limited to the sale or sharing of finished products in the past. For animations originally belonging to other media types, digital forms make it easier for these animations to be spread through TV media, and at the same time, they can be accurately delivered to the audience.

3. The Internet age

With the development of intelligent terminal technology, many animation enthusiasts can easily make animations and rely on the Internet for low-cost and efficient dissemination. The definition of animation media is no longer limited to perfect business organizations but belongs to all content producers. Through the virtual software, animation creators can test their animation works. They can first test the animation works for the minority, and constantly improve the attributes of the elements in the animation, to meet the needs of the public. It is difficult to verify the earliest animation uploaded to the Internet. Of course, this also proves that the development of personal computer media technology has greatly helped the increase in the number of animation information dissemination. At the same time, the new generation is alienated from the TV medium and natural close to the personal intelligent terminal, and the cost advantage and wide coverage of the Internet communication. So that the traditional animation media is on the information express. With the maturity of mobile personal intelligent terminals, mobile intelligent terminals represented by smart phones have rapidly become an indispensable component of animation information communication media. From the animation related information, whether animation publicity, animation subject materials and teaching or even animation advertising, intelligent terminal can be competent. (Baiyi,Li, 2023)

(1) The progress of network transmission technology. The network transmission technology in the early stage was difficult to support the transmission of high-capacity information, so most of the intelligent terminals in this period relied on the commonly equipped optical drives to improve this short board. With the gradual

progress of network transmission technology, both audiences and animation media can quickly complete the transmission of animation information with high information integrity.

(2) Mobile intelligent terminal. Mobile intelligent terminals represented by smart phones have greatly removed the obstacles of animation and animation information dissemination to individuals. By connecting to the Internet anytime and anywhere, as well as relying on its own functions, mobile intelligent terminals play a good role in disseminating animation information.

(3) Virtual reality technology and reality enhancement technology. Virtual Reality technology, English is called Virtual Reality, referred to as VR. Reality Augmented technology, English full called Augmented Reality, referred to as AR. With the assistance of virtual technology, animation works of new media can better promote the audience's perception of new media. This technology can make the animation have strong interactivity, and the audience can interact with the scene and the animation at will, with a high sense of immersion. (Baiyi,Li, 2023)

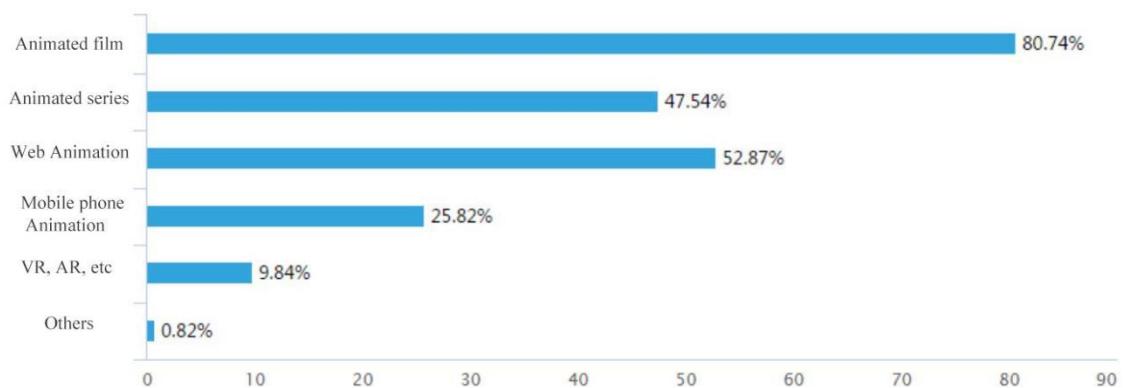


Figure 14 Types of animation works favored by audiences.

Source: (Geng, 2017)

In the survey of "types of animated works favored by audiences", more audiences choose to watch animated films. Animated films have the advantages of shorter duration, more compact content, and more age groups, making them the first choice for animation audiences. The second is to choose the audience of network animation, its short, funny, interactive and other characteristics has become a popular form of animation. TV cartoons, which are long, slow and always have to catch up with others, hold back a larger audience, but still rank third. Nowadays, through the Internet, the audience can choose to watch any kind of animation form, whether it is TV or film, they can find resources on the Internet. Therefore, the integration of media also makes the audience begin to merge, and the audience of computer and mobile phone can also become the audience of film and TV. (Geng, 2017)

The shaping process of animation aesthetic paradigm is essentially the evolution process of the combination of technology and art. Under the influence of globalization, Chinese animation is facing the double challenges of technological innovation and cultural inheritance. Since the 1980s, China has become an animation processing base, which gradually accumulates in technology, but faces the demand for remodeling in aesthetic sense. For example, from the digital conversion of traditional ink painting to the adoption of minimalist comic style, Chinese animation has gradually formed its own characteristics. During this period, animation was not only a display of technology, but also a carrier of cultural and aesthetic ideas. The simplification and refinement of the animation shape make the animation image have stronger visual impact and recognition and provide a platform for the audience to resonate with emotion. In this process, re-examining and innovating traditional cultural elements, combined with modern technology, is crucial for the shaping of the local animation aesthetic paradigm. From imitation to innovation, Chinese animation is gradually becoming mature, building a unique aesthetic style. (Xue, 2019)

The expression of science and arts in various forms reveals humanity's profound understanding of scientific exploration and creative expression. In animated short films, particularly those showcased through the Anima Mundi International Animation Festival, the portrayal of technology and scientists is diverse, ranging from traditional stereotypes to more inclusive and diverse representations. The scientist characters in these works, especially female scientists, are often depicted as intelligent, assertive, and respected figures, wearing lab coats and conducting experiments both in the laboratory and in the field, reflecting society's widespread recognition and respect for scientific professions. Furthermore, the portrayal of science in animation also includes challenging gender stereotypes, encouraging teenagers, especially girls, to be interested in and involved in science. Through this artistic and literary form, technology serves not only as a medium for the transmission of knowledge but also as a force to inspire innovative thinking and social change. This interdisciplinary integration promotes public understanding of science while also expanding the boundaries of artistic expression, demonstrating the potential for mutual promotion and co-development of technology and artistic literature (Reznik & Massarani, 2019).

And the development so far, digital animation has presented the phenomenon of media convergence. Media convergence has greatly promoted the development of China's animation industry, which is manifested in the following aspects: First, technological progress and the rise of the Internet have provided diversified display platforms for animation and promoted the innovation and diversification of art forms. Secondly, the input of national resources and policy protection provide a stable

development environment for animation production. In addition, the rise of "we media" has provided opportunities for individual creators to showcase their talents and injected fresh blood into the animation market. Although the reform of the economic system and the opening of the cultural environment have brought the pressure of external competition, they have also stimulated the competition and innovation within the industry and promoted the upgrading of animation content and production technology. Finally, the linkage cooperation and cross-industry integration of the animation industry have broadened the application scenarios of animation, making it not only limited to entertainment, but also penetrated many fields such as education and advertising, demonstrating the unbounded characteristics of animation media and the potential of cultural communication. (Mingming, 2022)

The three stages of the formation of media convergence in China, namely "media mutual hearing", "media competition and cooperation" and "media convergence", gradually evolved as follows:

1. Media exchange (1920s to before the founding of New China): This stage marked the beginning of media convergence. The emerging media of radio and film were introduced into China and began to have initial contact and influence with traditional media such as newspapers and magazines, and there was a phenomenon of exchange between media.

2. Media competition and cooperation (from the founding of the People's Republic of China to the emergence of the Internet): In this stage, with economic reform and technological development, traditional media began to try to cooperate with new media to compete, such as TV stations, radio stations and newspapers to achieve content sharing and complementary.

3. Media convergence (since the popularization of the Internet): with the rapid development of digital technology and network technology, the boundaries of media began to blur, all kinds of media began to integrate into one, and users had more freedom to obtain information. The boundary between new media such as Internet platform and traditional media such as TV and newspapers melted, realizing the full integration of technology, content and channels. (Mingming, 2022)

The reason why animation can keep its advantage in the background of media convergence is that its media boundary has the characteristic of "no boundary", which can flexibly adapt to the changes of different technologies and art forms. Animation can not only be presented on multiple platforms such as film, television and the Internet, but also continuously absorb new forms of expression through technical means and artistic innovation, such as online games and Danmau culture, to maintain freshness and vitality. Secondly, with rich artistic achievements and high-quality

production, Chinese animation has established brand influence in the era of competition and cooperation. Moreover, with the development of science and technology and economy, and the opening of cultural vision, animation, as a medium, caters to the diversified needs of the audience. Through the We media platform, the diversified works of individual creators and big labels enrich the market together. Finally, the development of animation is no longer limited within the industry, but through cross-industry linkage, expanding the production and influence. These factors together make animation maintain its dominant position in the wave of media integration. (Mingming, 2022)

In the environment of digital media integration, animation images are endowed with unique "digital genes", which not only transform the production and presentation form of animation, but also profoundly affect the transmission and reception of animation content. Digital technology, such as the digital production of 2D and 3D animation and stop-motion animation, as well as motion and expression capture technology, makes animation production more efficient and diversified. These technologies are not limited to the traditional animation field, but also extend to various digital media, such as the Internet and social platforms, which enhance the interactivity and accessibility of animation works. In terms of cultural ecology, animation is no longer just a form of entertainment, but a comprehensive way of cultural expression. Its value is not only reflected in the art, but also in its important role in the dissemination of information and ideas in the digital environment. The non-linear and individual characteristics of animation make it better reflect and adapt to the needs of the information age under the background of post-modernism. In addition, the development of animation in the environment of digital media convergence has also led to its diversification in function and form. Animation is not only a tool for information dissemination, but also a carrier for cultural and social topics. It presents more complex and profound themes through the interweaving of virtual and reality, making animation an indispensable part of modern society. (Xue, 2019)

Under the background of media convergence, the creation, dissemination and acceptance of animation begin to take the needs of the audience as the center, and the use of new media technology has greatly satisfied the needs of the audience. The influence of media convergence on the psychology of animation audiences is mainly reflected in several aspects:

1. Diversified viewing channels: With the development of the Internet, mobile Internet and wearable interactive devices, the audience's viewing platform has shifted from traditional TV to a more diversified direction. This enables the audience to

easily access the animation on different occasions and at different times, thus greatly expanding the audience of animation.

2. Improvement of aesthetic demand and ability: the integration of multiple media not only enriches the expression form of animation, but also changes the audience's aesthetic channel and experience of animation. Audiences have a wider choice of animation content, and their requirements for animation quality are also increasing day by day.

3. The transformation of psychological needs: In the era of media convergence, audiences have formed new psychological needs when accepting animations. They are not only passively receiving information, but more actively looking for animation content that conforms to their interests and aesthetic.

4. Challenges of social and educational functions: with the diversification of animation content and the expansion of audience groups, the social and educational functions of animation are also facing challenges. Market competition and interest drive may lead to the emergence of some undesirable content, which has an impact on the physical and mental health of adolescents.

To sum up, the impact of media convergence on the psychology of animation audiences is multifaceted, including the change of viewing habits, the improvement of aesthetic ability and the transformation of psychological needs. This requires the animation creation in the pursuit of artistic and audience appeal at the same time, also need to pay attention to its social responsibility and educational significance. (Geng, 2017)

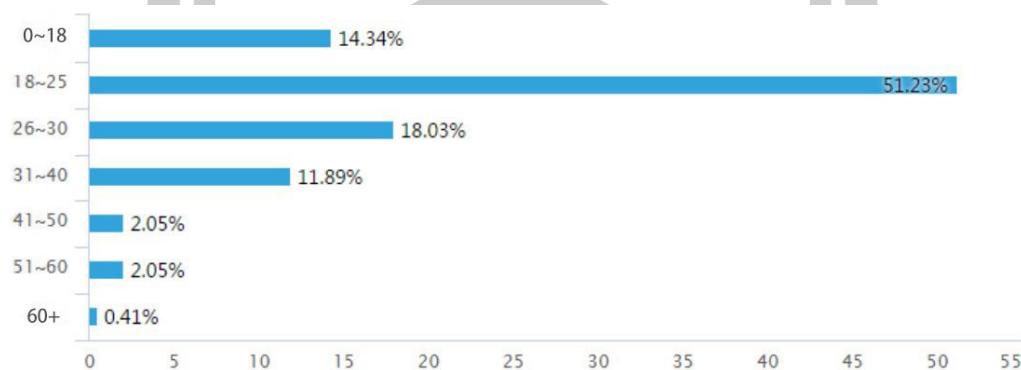


Figure 15 Age structure of animation audience.

Source: (Geng, 2017)

According to a questionnaire survey with the theme of "age structure of animation audience", 14.34% of the 244 respondents were under the age of 18. The audience aged 18-25 accounted for 51.23%; The audience aged 26-30 accounted for 18.03%; The audience aged 31-40 accounted for 11.89%. The audience over 41 years

old accounted for 4.51 percent. The survey shows that 69.26% of the animation audience is between 18 and 30 years old, and the audience is obviously adult. (Geng, 2017)

In the questionnaire survey of "audience gender structure ratio", women slightly outnumbered men. Female audience accounted for 55.33%; Male audiences accounted for 44.67%, and females were generally more than males.

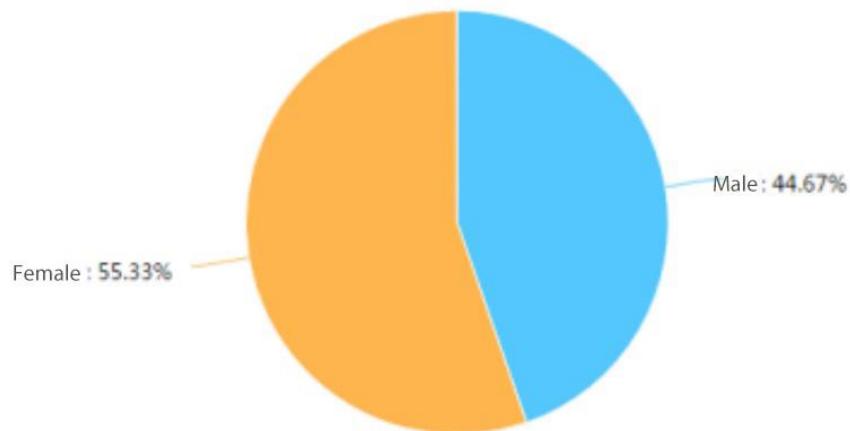


Figure 16 Animation audience gender structure ratio.

Source: (Geng, 2017)

The questionnaire survey of "the number of audiences watching animation" shows that 4.1% of Chinese animation audiences are extremely obsessed with watching animation works; 43.85% of the audience often watch animation; 41.8% of the audience occasionally watched animation works; 8.2% of the audience rarely watched animation works; There are 2.05% of the audience do not like to watch animation works, indicating that the audience has a high acceptance of animation.

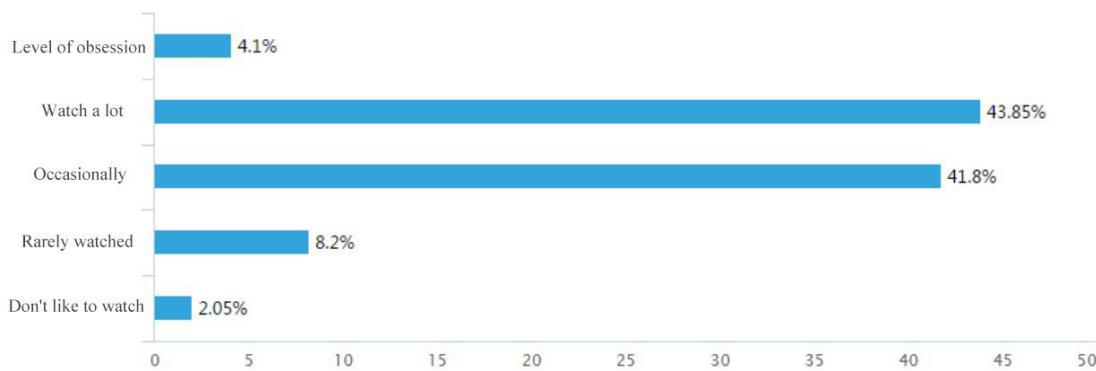


Figure 17 Number of animations watched by audiences.

Source: (Geng, 2017)

In the questionnaire survey on "audience love situation": 53.28% of the audience is single; 13.93% of the audience is in contact; 32.79% of the audience are married. Many students lead to a high proportion of single groups in the animation audience, and single people often have a higher demand for animation.

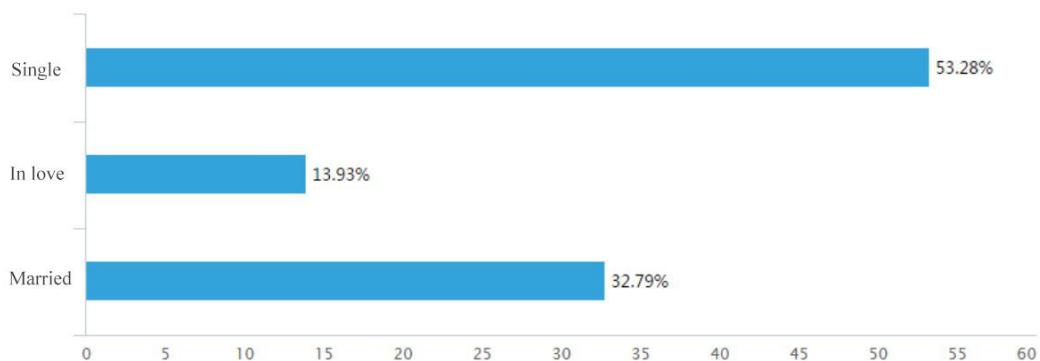


Figure 18 Audience love situation.

Source: (Geng, 2017)

In the questionnaire survey on "education background of the audience", it shows that the audience with a bachelor's degree has reached 79.1%. On the one hand, it is related to the more active Internet behavior of college students, and it is also quite different from our traditional belief that the audience of animation is mainly primary school and junior high school, and the higher education level also has higher comprehensive requirements for animation.

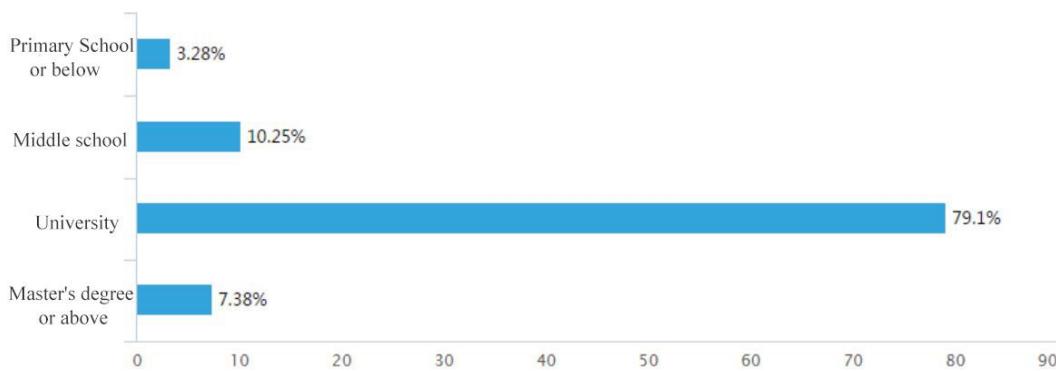


Figure 19 Educational background of the audience.

Source: (Geng, 2017)

In the survey of "audience online behavior", it is shown that watching video is the most popular choice of animation audience. With the popularization of mobile 5G network, family and public WIFI network, watching video no longer needs to cost expensive data fees, and video has become the most popular form of transmitting information, in which animation as a video media is also included.

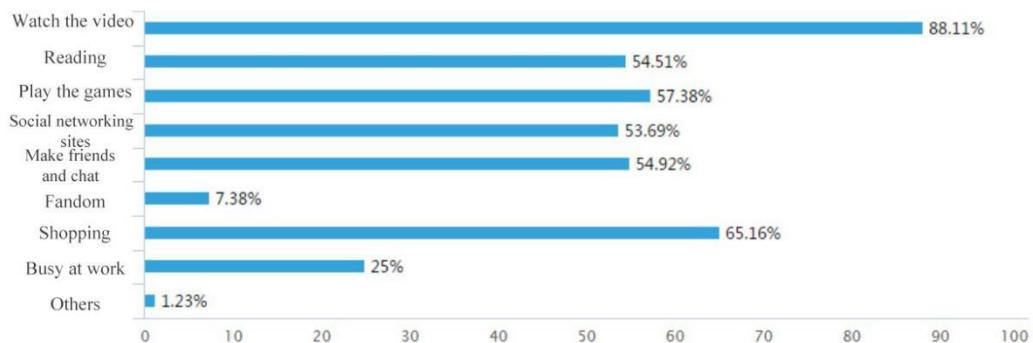


Figure 20 Audience online behavior.

Source: (Geng, 2017)

In the era of media convergence, the sensory needs of animation audiences have changed significantly. First, the audience has higher requirements for the visual experience of animation, paying attention to the texture and visual effects of the picture. With the advancement of technology, animation is not only played on TV and movies, but also presented on the web and mobile platforms, which requires animation to provide a clear and smooth visual experience on different devices. Secondly, the audience's demand for the diversity of animation content has increased, no longer limited to traditional types, but the pursuit of personalized, diversified themes and styles. This also reflects the improvement of the audience's aesthetic ability and the acceptance of multi-culture. Moreover, the audio effect is equally important, high-quality dubbing and music become the key factor to attract the

audience. Finally, the demand for interactivity among animation audiences has risen, and they want more opportunities for participation and interaction during animation viewing, such as communicating with creators and other viewers through social media platforms. In summary, media integration brings richer and diversified sensory experience to animation audiences. (Geng, 2017)

In the era of media convergence, the transformation of audience's emotional needs is mainly reflected in the following aspects:

1. Personalization and selection diversification: With the diversification of media, audiences pay more attention to their personal preferences in the selection of animation and other content and pursue more personalized and in line with their emotional needs.
2. Enhanced interactivity: With the development of emerging media technologies, the audience is no longer passive in receiving information in one direction, but can participate in interaction through social media, comment section and other ways, which meets the audience's emotional demand for participation and belonging.
3. Convenience and immediacy: In the fast-paced life, the audience is more and more inclined to access information anytime and anywhere through mobile phones and other portable devices, which meets the change of the pursuit of efficiency and instant satisfaction of emotional needs.
4. Emotional resonance and value identity: When selecting media content, modern audiences pay more attention to emotional resonance consistent with their personal values and choose content that can trigger empathy and reflection.

In general, the emotional needs of audiences in the era of media convergence are constantly developing toward personalization, interactivity, convenience and emotional resonance. These changes have had a profound impact on the creation and transmission of animation content. (Geng, 2017)

In the era of media convergence, the rational needs of the audience have experienced a remarkable transformation. In the traditional mass media era, information dissemination is relatively single, and the audience is in a passive state of acceptance. However, with the progress of technology and the multi-functional integration of media, new and old media are integrated, and the way audiences receive them is also changing. The audience changes from passive receiving information to active seeking information, from single demand to diversified demand. In the field of animation, this transformation is reflected in the diversification of types, themes and role Settings, and the audience's requirements for knowledge, narrative methods and participation are also higher. Therefore, the rational needs of the audience are no

longer limited to receiving information, but tend to deeply understand and actively participate, and pursue higher levels of psychological satisfaction. This transformation promotes the innovation of media content and form and promotes the audience to have a deeper understanding and experience of media content both rationally and emotionally. (Geng, 2017)

Under the background of media convergence, the creation, dissemination and acceptance of animation begin to take the needs of the audience as the center, and the use of new media technology has greatly satisfied the needs of the audience. Through the change of media development, we can also see the transformation relationship among animation technology, audience psychology and animation industry, which reveals the reasons behind the reform of China's animation industry, and also reflects on the problems existing in the reform. (Geng, 2017)

To sum up, the role of digital media is becoming more and more important, which not only plays a crucial role in the process of design and creation, but also in the later broadcast. In the future, the development of digital media will also provide more technical support for the development of film and television animation. Therefore, with the continuous development and innovation of science and technology, we can expect more profound changes in all aspects of animation production, performance, creation, communication, dissemination and application.

2.2.5 Changes in audience's aesthetic needs and habits

The concept of aesthetic in animation focuses on various aspects of animation design, including image design, motion, and dynamics. These concepts not only concern the visual representation of animation but also encompass the creative and technical methods involved in the animation production process. According to Maureen Furniss' "The Animation Aesthetic" (1998), animation aesthetics can be understood not only through the still frames of animation but also through the analysis of animation design and motion.

Alice Guillermo's semiotic framework divides the analysis of animated works into basic and iconic levels, discussing the formal aspects of animation itself at these levels. The contextual level explains how these animated works deviate from tradition in response to specific circumstances of the creators. Additionally, in "Reading Images" (2001), she points out that artistic works are created and understood within specific historical, social, geographical, and political contexts, and thus, their meanings are also generated and understood within these specific contexts. Animation is not merely a visual art form; it is also an artistic expression that reflects the era and social environment of its creators through its creation and exhibition process (Velasco, 2020).

After a hundred years of development, Chinese animation has gradually developed its own aesthetic path. Xiao Lu wrote the "Traditional Aesthetic Characteristics of Domestic animated films and Their Cultural sources" put forward that the aesthetic characteristics of domestic animated films is in the pursuit of traditional national art and artistic conception beauty, reflecting "meaning beauty" and "moral beauty", the traditional animated films of our country through the refinement of folk stories and traditional Confucianism, reflects the Chinese traditional aesthetic thought. (Pan&Zhengxuan, 2023)

The advantages are mainly reflected in the following aspects: First, in the creation process, Chinese animation films make full use of the combination with traditional literature and art. Through the integration of papercut, puppet, ink and other art forms, they create cartoons with unique Chinese aesthetic charm. This creation style, which takes Chinese painting aesthetics as the core, makes Chinese cartoons have unique artistic characteristics and aesthetic value. Secondly, the technical capabilities of Chinese animation have gained high recognition overseas. By introducing foreign techniques and film ideas, Chinese animation pursues innovation in the production process, such as introducing the concept of "camera motion", which changes the traditional way of painting composition. However, despite the continuous progress of technology, Chinese animation still insists on retaining the traditional style of painting techniques and color use, which is of great significance for the inheritance and development of Chinese culture. Finally, while learning new creation ideas and methods from abroad, contemporary young animation creation groups still focus on the characteristics of "nationalization" to create. They dig deeply into the deep connotation of traditional culture, and carefully polish Chinese stories and characters, so that the animation works have more unique charm of Chinese culture. (Zheyu&Chenhui, 2022)

In general, the aesthetic highlights of Chinese animation are reflected in its unique creation style of Chinese aesthetic charm, recognition of technical ability, and in-depth excavation and innovation of traditional culture. In the future, Chinese animation should continue to pay attention to the effective refinement of traditional culture and the careful polishing of story characters, and at the same time combine modern elements to find a balance between Chinese and Western integration, to enhance the international competitiveness of Chinese animation. (Zheyu,Chenhui, 2022)

In the "audience prefer animation style" survey results show that like to watch 3D animation audience proportion is the highest. This is because the audience generally has the psychology of "seeking truth", which is mainly applied to

journalism. It means that the audience is eager to know the occurrence and development of events in the first place, and obtain the same psychological resonance through the scene, the sense of witness and the sense of participation. The authenticity of the picture is the general premise of the authenticity of the content. The development of almost all artistic styles of film and television art, including animation, is based on whether it can realize and reflect the "authenticity". In Western traditional thought, "truth" has always been an eternal problem discussed by philosophers, and it is also the goal and demand of philosophy, which has become a basic paradigm in Western philosophy. Influenced by the Western philosophical trend of thought, Western aesthetics also regard "beauty and truth" as the same principle and artistic pursuit, and regard truth as the value and judgment standard of artistic pursuit. The "imitation theory" of ancient Greece has constructed the "realistic" tendency of Western art, and the wide use of "perspective" in the Renaissance has enabled artists to create virtual and realistic stereoscopic images on a two-dimensional plane. George Santayana, an American aesthete, said, "Whenever we find amazing fidelity in any kind of imitation, we must feel happy." Therefore, the continuous vividness of animation pictures can also be regarded as the continuation of the general aesthetic pursuit of the audience. Both film and television put the issue of "real" in the core position of communication, acceptance, creation and aesthetic. (Geng, 2017)

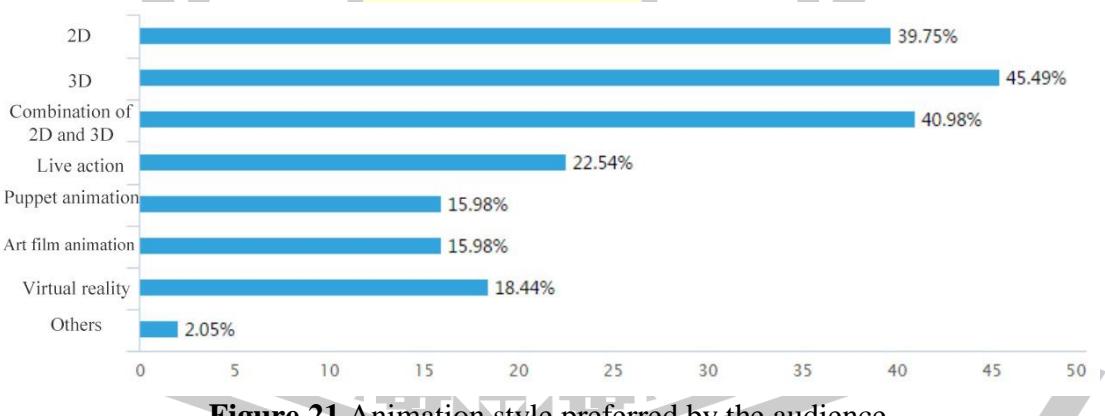


Figure 21 Animation style preferred by the audience.

Source: (Geng, 2017)

However, the existing problems of Chinese animation aesthetics mainly appear in the following aspects: the deficiency of Chinese animation aesthetics is mainly manifested in the overall weak script creation ability, lack of innovation, lack of convincing plot, far-off emotional promotion, poor control of rhythm, role symbolization, sloganization and so on. In addition, the overall narrative of domestic animations is still tilted toward the younger age, lacking effective refinement of traditional cultural spirit and careful polishing of stories and characters. To achieve

"breakthrough innovation" in a short period of time, creators tend to imitate foreign animations, and pursue high technology, high box office and influence too much, resulting in relatively inexperienced and unskilled performance of realistic subjects. In contrast, the performance of mythological themes and legend stories is more comfortable, but when converting to modern stories, the creation enthusiasm and accuracy are not high enough. Chinese animation needs to reflect "nationalization" not only in the past, but also in the present. Animated films should seek a balance between Chinese and Western integration, combine the deep value of traditional cultural content with modern elements, and create an aesthetic space of Chinese culture. In addition, Chinese animation also needs to connect with the marketization and film industrialization and form a consistent with the market film concept to achieve better development. (Zheyu&Chenhui, 2022)

To sum up, the aesthetic deficiency of Chinese animation is mainly reflected in the weak ability of script creation, lack of innovation, and lack of convincing plot. To break through and innovate, Chinese animation needs to integrate traditional culture with modern elements and be in line with marketization and film industrialization. In this way, we can create high-quality animation works with more artistic and market competitiveness. (Zheyu&Chenhui, 2022)

In the local context, the local animation aesthetic realizes a dynamic process of aesthetic diversity and cultural depth through the interaction and innovation experiment of culture, technology and media, which mainly goes through the following important stages:

1. Cultural integration: Combine traditional and modern cultural elements to achieve cultural integration in different themes of animation, so that the animation has more local characteristics and global appeal.
2. Technical innovation: Through the progress of technology, such as special effects and animation production, improve the quality of works, strengthen the visual impact and story expression ability, and be in line with international standards.
3. Media integration: Using digital network, social media and other new media means, animation content is more diversified and interactive, attracting different age groups and interest groups.
4. Social reflection: integrate social and cultural issues into animation works, reflect the characteristics of The Times, and enhance public resonance and cultural confidence.
5. Artistic experimentation: Innovation and experimentation are encouraged to explore different animation styles and expressions to achieve artistic and aesthetic diversity. (Xue, 2019)

After experiencing the above five stages of evolution, Chinese animation aesthetics gradually appeared the phenomenon of "layered bridging", which is mainly reflected in the following aspects. First, local animation creators have a deep understanding of the national cultural environment and can import their works into real life. This means that they can create works with unique national aesthetics from the perspective of national culture, so that the audience can feel their cultural identity while enjoying the animation. For example, traditional and contemporary cultural elements are integrated into the animation content, and social groups at different levels can be immersed in the information matrix through the forms of animation emoticons, animated series, animated movies and so on. Secondly, the value evaluation of animation art reflects the characteristics of the standard of diversification. In the era of information fragmentation, the aesthetic of animation presents a nonlinear trend, and the standard of commonality and individuality exist at the same time. The accurate analysis of big data and the pertinence of communication terminals enable the aesthetic of animation art to meet the needs of different audience groups and become a bridge agent for contemporary cultural psychological stratification. For example, through the promotion of the short film "What is Peppa", the animated film "Peppa Pig's New Year" has become a link between the rural grandfather and the children and grandchildren of the city, bridging the cultural differences between different groups. Finally, the ontology of animation produces more alienation and extension. In the context of media convergence, animation art is not only limited to traditional forms of animation, but also extended to animated film special effects, peripheral extension development and comprehensive application of technology. Such developments integrate animation art with other art forms to create a more diverse and rich aesthetic experience of animation. At the same time, the extension space of animation is also broadened, not only limited to the animation ontology, but also including the cross interaction with other media forms, further bridging the appreciation needs of different levels of audiences for animation art. (Xue, 2019)

In a word, the hierarchical integration of animation aesthetics in the local context is reflected in the deep understanding of national culture, the value judgment of the standard of differentiation and the alienation and extension of animation art. This development trend not only enriches the form and content of animation creation, but also promotes the revival of animation art in the local social economy and civilization ecology. (Yanmei&Xiaoli et al., 2022)

The new development trend of Chinese animation aesthetics can be found through the animation design of the opening ceremony of the 2002 Beijing Winter Olympics. That is, cosmopolitanism, future, nationality.

1. The embodiment of "worldliness" lies in how to integrate the essence of traditional Chinese culture with contemporary values and present it to the global audience innovatively. For example, the opening ceremony of the Beijing Winter Olympics featured the "Start of Spring" segment and the "Ice and Snow Five Rings" animation. These ideas not only show the profound and social repercussions of Chinese culture, but also incorporate ideas such as "innovating" to show the international value of Chinese culture. The application of digital ink painting animation presents traditional Chinese culture with modern scientific and technological means, combines the aesthetic concept of national culture with international sports projects, shows the spiritual core of "Chinese style", and successfully transforms into the presentation effect of "international style". In addition, the development of Chinese animation should not only pursue the national character, but also stand on the world stage, integrate Chinese animation creativity and industry into the global animation family, show China's characteristics of The Times and the level of scientific and technological development, and make it become a cultural expression with international resonance. (Yanmei&Xiaoli et al., 2022)

2. On "The future" First of all, the future is reflected in the positive application of Chinese animation to the current development of science and technology. With the continuous progress of science and technology, animation creators are facing the impact of continuous software updates and innovative ideas. They need to keep up with the pulse of The Times and constantly broaden their creative ideas and creative methods in the tide of rapid development of science and technology. For example, through the technical means of digital ink painting animation, traditional Chinese culture can be shown to the world in a new way, and the goal of exporting Chinese animation to the world can be realized. Secondly, the future is also reflected in the innovative expression of Chinese animation on traditional national culture. Chinese excellent traditional culture has risen to the level of national strategy and become a basic national policy. Based on inheriting and developing traditional culture, Chinese animation creators need to dig deeply into its contemporary value and world significance and show it in innovative and creative ways. By combining traditional culture with modern technology, Chinese animation can better inherit the spiritual lifeblood of the Chinese nation and reflect China's characteristics of The Times and the level of scientific and technological development. Finally, the future is also reflected in the international development direction of Chinese animation. Chinese animation needs to stand at the international level of the world, while sticking to the development direction of national character. By integrating Chinese animation creativity and industry into the big family of animation in the world, Chinese

animation can achieve worldwide influence and recognition and show China's international vision and acceptance and inclusiveness. For example, at the opening ceremony of the Winter Olympics, the ink animation human figure on the Ice Cube showed the characteristics of Chinese style, modernity, fashion and movement. Through scientific and technological means, the traditional culture and aesthetic concept of the Chinese people were applied to sports events around the world, realizing the effect of showing the spiritual core of the "Chinese style" to the world. (Yanmei&Xiaoli et al., 2022)

To sum up, the future is reflected in the scientific and technological application, innovative expression and international development direction of Chinese animation. By keeping up with the development of science and technology, innovating traditional cultural expressions and integrating into the world animation family, Chinese animation can achieve a broader development space and a higher international influence.

The embodiment of "national character" in the development of Chinese animation is through the integration of the essence of traditional Chinese culture and modern science and technology in the form of innovation. This process not only inherits and carries forward the spirit of Chinese aesthetics, but also reflects the unique human geography culture of China, forming profound human values and aesthetic pursuits. For example, the digital ink animation human figure in the opening ceremony of the Winter Olympics not only shows the "vivid spirit" and "both form and spirit" of Chinese culture, but also reflects the aesthetic pursuit of "the unity of nature and man". At the same time, this combination is also reflected in the fusion of traditional culture and new media communication, aiming to improve the country's cultural soft power through innovative means and promote the construction of socialist cultural power. In this way, Chinese animation not only shows its unique cultural characteristics on the international stage, but also promotes the inheritance and development of national culture. (Yanmei&Xiaoli et al., 2022)

To sum up, the inheritance and development of Chinese excellent traditional culture has risen to the height of national strategic significance and become a basic national policy. At the same time, we also realize that the inheritance and development of Chinese excellent traditional culture is facing many challenges and difficulties. We need to break through the gap between traditional culture and new media communication, actively explore, speak for The Times, and cheer for the nation. The metaphysical is the way, the metaphysical is the instrument. According to this theory, Chinese culture is the level of Tao, and the means and media of realization are the metaphysical level, "the principle should be deep, the words should be shallow,

extremely intelligent, and the doctrine of the mean." At the same time, carrying forward the excellent traditional Chinese culture is not simply inheriting and imitating, but constantly discovering the essence, inheriting and innovating, and reflecting China's characteristics of The Times and the level of scientific and technological development in the works. To combine the traditional culture and modern technology, the more national animation art is, the more cosmopolitan it will be. Only by integrating Chinese animation creativity and industry into the big family of world animation can the spring of Chinese animation come.

2.3 Watercolor language expression in digital animation production environment

In the author's view, watercolor art and animation creation, two seemingly different art forms, but there is a wonderful commonality. The integration of watercolor art and animation creation can not only enhance their respective artistic value, but also create a new visual experience, thus bringing a series of unique values. First, watercolor art and animation creation are the embodiment of visual art. With its unique color language and techniques, watercolor painting shows the poetry of nature and life. Animation, on the other hand, uses painting, photography, digital technology and other means to create dynamic visual effects, tell stories, and convey emotions. The fusion of the two can create a unique visual experience between static and dynamic. The dexterity of watercolor painting and the vividness of animation interweave each other, forming a novel art form, which has a strong artistic appeal and visual impact. Secondly, the integration of watercolor art and animation creation can provide a broader imagination space for the audience. The freehand nature of watercolor painting and the virtual reality technology of animation can guide the audience into a scene that is both realistic and beyond reality. This kind of scene can stimulate the imagination of the audience, prompting them to actively think and experience. At the same time, this integration can also provide a broader creative space for artists, so that they can freely exert their creative talents and create richer and more diverse works of art. Finally, the integration of watercolor art and animation creation can promote the innovation and development of art education. This integration can provide new teaching contents and methods for art education. For example, by applying the techniques of watercolor painting to the creation of animation, students' innovative ability and practical ability can be cultivated. By applying the color performance of watercolor painting to animation creation, students' color perception and application ability can be cultivated. By applying the freehand expressiveness of watercolor painting to animation creation, students' artistic sense and aesthetic ability can be cultivated. (Ding, 2016)

And watercolor language in the creation of animation has the following unique aesthetic value: first, watercolor through its transparency and color flavor, can create a unique artistic conception and art form. The characteristics of watercolor make the animation scene can better show the artistic form and atmosphere and improve the aesthetic taste of the animation. Secondly, the diversity and rich performance space of watercolors enrich the artistic effect of animation works. The use of watercolor language provides a rich expression space to produce animation scenes, making the animation more artistic sense and creativity. In addition, watercolor painting can create a moisture texture and texture effect of color light and shade intrinsic correlation. By using watercolor techniques, the animation scene can present rich color levels and texture effects and enhance the three-dimensional sense and visual enjoyment of the picture. Finally, watercolor painting can show the fusion of water and color, creating the effect of haziness, the relationship between virtual and real, and the sense of space. The unique charm of watercolor makes the animation scene have a higher artistic expression and improves the aesthetic value of the animation works. (Ding, 2016)

In short, the application of watercolor in animation creation has unique aesthetic value. It enhances the artistic effect and aesthetic taste of the animation scene through the characteristics of transparency, color charm and object texture, enriches the expression language and technique of the animation, and makes the animation work more artistic and creative.

2.3.1 The process of the combination of watercolor art and digital animation production technology

Although watercolor art is one of the oldest painting art forms, it does not affect its integration into the digital animation creation. In the creation of digital animation, the use of watercolor techniques for the animation scene to provide new forms of expression, will become a new direction of future development. Watercolor painting uses water as the medium to reconcile colors, which can enrich the performance effect of animation scenes. The unique artistic conception and art form of watercolor language used in the animation scene not only enhances the charm of the animation, but also enriches the expression language and technique of the animation. The diversity of watercolor techniques provides more abundant performance space to produce animation scenes. When drawing the animation scene, the dry painting method can be used to show the clear shape structure or the combination of dry and wet method to show the flexibility and thick sense of the animation scene. The transparency and color flavor of watercolor painting can create artistic conception for the animation scene and bring the audience a higher visual

enjoyment. The characteristics of watercolor and the interaction between water and color can form gorgeous and diverse effects, which enriches the artistic effect of animation works. In the creation of animation, watercolor can use its unique language forms and techniques to express the artistic form and atmosphere needed in the scene and provide a larger display space for the characters. The artistic conception, charm and style of watercolor painting can better improve the aesthetic taste of animation scenes. Therefore, the application of watercolor in animation creation not only enriches the expression language and technique of animation, but also improves the aesthetic value of animation works, and provides a possibility for the development of nationalization of animation. (Ding, 2016)

Table 1 List of animated movies coming out in 2022.

order	Release date	Title of film	Box office (Ten thousand Yuan)	Country (Region)	Type
1	Jan	Mulan: Out of the Sky (rerun)	40.6	China	3D
2	Jan	Magic Elves	631.7	China	3D
3	Jan	Full House Magic	7668.2	USA	3D
4	Jan	The Adorable Chicken Team: A New World	3434.4	China	3D
5	Jan	Team Wang Makes Great Achievements in Big Movies	8250.0	USA/Canada	3D
6	Jan	Toward the Bright Side	170.8	China	2D
7	Jan	Adventures of Princess Barbie	121.5	Netherlands	3D
8	Jan	"Counterattack 2"	0.3	China	3D
9	Feb	Bear: After Earth	97768.7	China	3D
10	Feb	Pleasant Goat and the Future in the Basket of Big Big Wolf	16050.8	China	2D
11	Feb	"Little Tiger and Big Hero"	2219.8	China	3D
12	Feb	Our Winter Olympics	6504.9	China	2D/3D
13	Mar	Monster Watch: Friend Forever	82.7	Japan	2D
14	Mar	The Legendary Young Wang Yangming	0.1	China	2D
15	Mar	The New Cinderella (rerun)	83.9	China	3D
16	Apr	Hotel Transylvania 4: Transformed	12374.5	USA	3D
17	Apr	Battle on the Prairie	190.2	China (Russia)	3D
18	Apr	Noah's Ark: Part 2	160.2	Germany /Ireland	3D

order	Release date	Title of film	Box office (Ten thousand Yuan)	Country (Region)	Type
				/Luxembourg	
19	Apr	The Badass League	33523.2	USA	3D
20	Apr	The Fantastic Adventure of the Little Mermaid (rerun)	227.4	China	3D
21	Apr	The Adventure of Stupid Bird (rerun)	146.8	China	3D
22	May	Doraemon: Nobita's Cosmic Wars	9918.0	Japan	2D
23	Jun	Magic Mouse Land (rerun) Power Rangers (rerun) Ali Baba and the Magic Lamp (rerun)	94.6	China	3D
24	Jun	Mulan: Out of the Sky (rerun)	38.1	China	3D
25	Jun	Magic Elves	40.0	China	3D
26	Jul	Undersea Column: Cave Adventure	7761.7	China	3D
27	Jul	Jurassic Land	145.0	China	3D
28	Jul	Out of Earth	1005.8	China	2D
29	Jul	The Heart of the Hero of Happy Superman	1656.3	China	3D
30	Jul	"Crazy! The Three Stars of Laurel Treasure"	1265.1	China	3D
31	Jul	Mini World Awakening	2714.9	China	3D
32	Jul	Little Pony: A New Generation	1720.4	Ireland/ USA	3D
33	Aug	The Pig Man Movie Ocean Diary	2939.5	China	3D
34	Aug	Goodbye Monster of the Classics of Mountains and Seas	3828.2	China	3D
35	Aug	"New Gods List: Yang Poke"	55550.4	China	3D
36	Aug	Minions: Despicable Me: A Prequel	23792.7	USA	3D
37	Aug	Nezha: The Battle Against the Dragon God	4.8	China	2D
38	Aug	Steel Armor	0.1	China	3D
39	Aug	Princess Freckles	1429.1	Japan	2D
40	Sep	Frog Kingdom - Extreme Sports	1500.0	China	3D
41	Oct	New Big Head Son and Little	8277.3	China	3D

order	Release date	Title of film	Box office (Ten thousand Yuan)	Country (Region)	Type
		Head Dad 5: My Alien Friends			
order	Release date	Title of film	Box office (Ten thousand Yuan)	Country (Region)	Type
42	Oct	I Am a Tyrannosaurus Rex	3275.0	China	3D
43	Oct	The New Cinderella 2	3160.7	China	3D
44	Nov	The Adventures of the Frog Prince 2	354.7	China	3D
45	Nov	Cat and Dog Martial Arts	366.7	UK/USA	3D
46	Nov	Detective Conan: The Bride of Halloween	17534.2	Japan	2D
47	Nov	Teenage Mutant Ninja Turtles: Rise	390.2	USA	2D
48	Dec	The King of Voyages: The Redheaded Song	16248.7	Japan	2D
49	Dec	Puss in Boots 2	664.1	USA	3D
50	Dec	Dragon Horse! The New Prince of Tennis	11.6	Japan	3D
51	Dec	Journey to the West: 72 Changes	127.5	China	3D
52	Dec	The Oak Restaurant	1.1	China	2D

Data from the State Film Administration show that the total box office of Chinese films in 2022 is 30.067 billion yuan, of which the box office of domestic films is

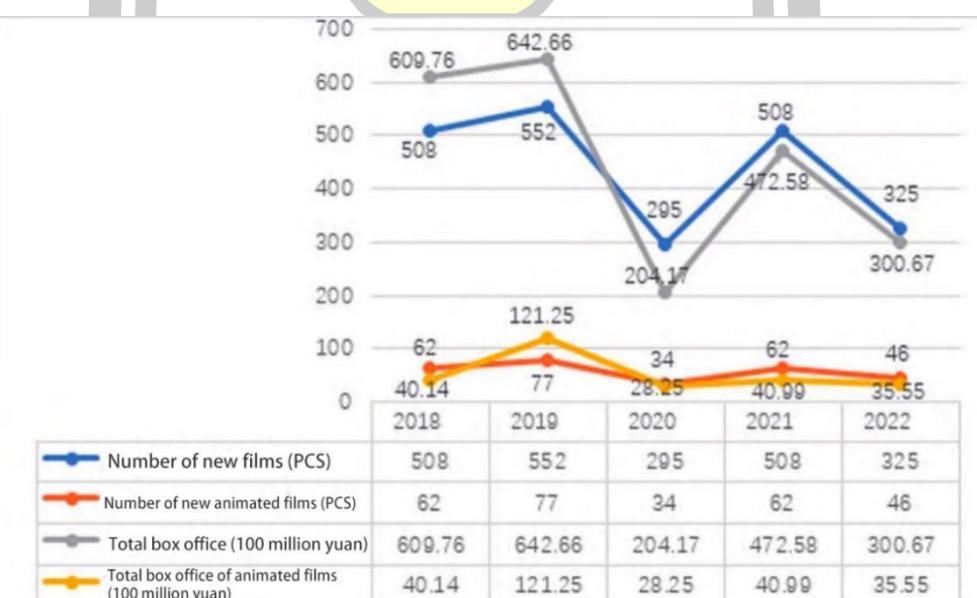


Figure 22 New releases of animated films and all films in 2018-2022

Source: (Pan&Zhengxuan, 2023)

25.511-billion-yuan, accounting for 84.85% of the total box office. The number of moviegoers in urban cinemas was 712 million. The data comes from (State Film Administration: The total box office of Chinese films in 2022 is 30.067 billion Yuan, CCTV News, Accessed January 1, 2022) As of December 31, 2022, there were 325 new movies released in the year, down 36.0% year-on-year; The total box office fell by 36.4% year-on-year, and the gap was further widened compared with that before the epidemic. In terms of animated films, 46 new films were released throughout the year, down 25.8% year on year. The total box office was 3.555 billion yuan, down 13.3 percent year-on-year. The number of animated films released accounted for 14.2% of the total number of films, and the box office accounted for 11.9%. The overall performance was slightly weak, and it was far from reaching the expected proportion of animated films in mature markets (15%-20%). However, the number of animated films released in 2022, and the proportion of box office increased by 0.88 and 3.21 percentage points respectively compared with 2021. Although its contribution to the box office was not as good as that of Nezha, it also exceeded that of 2018 and 2021 and approached the level of 2020, showing the relative stability of the animated film market in the post-epidemic period.(Pan&Zhengxuan, 2023)

As of December 31, 2022, a total of 52 animated films have been released in 2022, including 33 domestic animations (including 6 re-releases), 9 American animations (including co-productions), 6 Japanese animations, and 5 European animations (including co-productions). There are even some produced by Russia and released in China. Domestic translation, OEM "fake domestic" film 1, no Sino-foreign co-production animation. Among them, the number of domestic animations accounted for 63.5%, the box office accounted for 62.2%, the number of box office share is basically the same, reflecting the domestic animation film is not lost in the introduction of film money. From the perspective of the proportion of domestic animation and imported animation box office in the past five years, with 2019 as the cut-off point, domestic animation began to surpass foreign animation box office for the first time and reversed from less than 40% to more than 60%. This shift was apparently helped by Ne Zha, which topped the box office with 5 billion yuan in summer 2019. The film has not only become a milestone in the maturity of China's animation film market, but also injected unprecedented confidence and encouragement into the popular slogan "the rise of China's animation". With the momentum of the "Ne Zha" phenomenon and the expectations and support of the majority of audiences, Jiang Ziya in 2020, White Snake 2: The Rise of the Green Snake and Ne Zha Reborn in 2021, and Ne Zha in 2022: Yang Jian "and other big

production myth animation films are more than 400 million yuan at the top of the domestic animation films, the domestic animation films accounted for a stable box office at 60%, in the United States, Japan and other animation countries a lot of excellent introduction of animation "containment", held the leading share of domestic animation.(Pan&Zhengxuan, 2023)

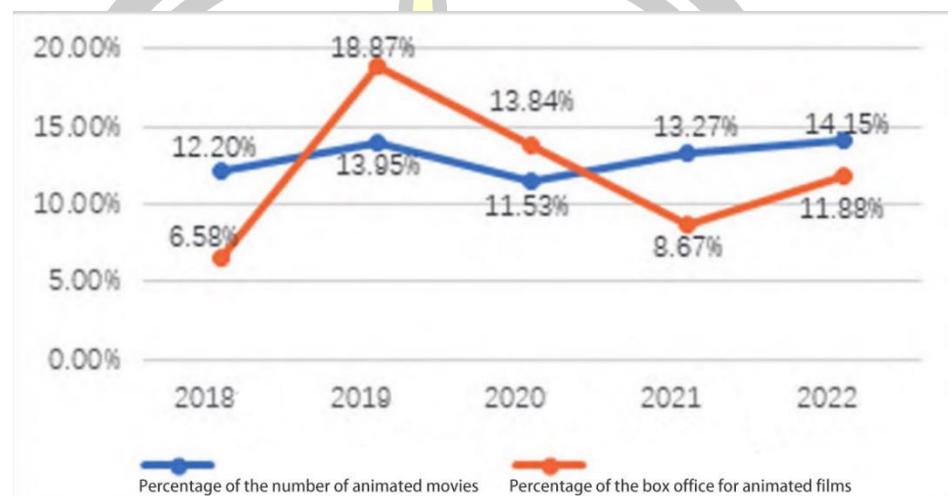


Figure 23 Market share of Chinese animated film box office in 2018-2022
Source: (Pan&Zhengxuan, 2023)

Among the top 10 animated films in 2022, domestic animated films occupied 4 seats, and "Bear · After Earth" and "New God List: Yang Jian" won the runner-up, while American and Japanese animations accounted for 3 seats each (Figure 4). Imported animation, mainly from the United States and Japan, has been highly competitive in the market due to its distinctive features and cutting-edge production technology. Although in recent years, under the influence of the epidemic, the influence of Hollywood animation shows a trend of fluctuation and decline, and no longer occupies an absolute advantage of more than half of the country, it still stands strong with its excellent quality. The market competitiveness of Japanese animation films is slightly less than that of American animation, but it can still maintain a stable position because of its mature 2D animation technology and the quadratic stickability of popular ips. After experiencing the twists and turns of sudden epidemic and plunging withdrawal in 2020, domestic animation returned to life in 2021 and 2022, keeping up with the good works in 2019, and even once again showing a trend of surpassing the number of imported animation releases and box office revenues. Although there is still a slight lack of word-of mouth and topical works, it can also highlight the gratification growth of domestic animated films -- the industry tends to

be mature and stable, the audience gradually expands and fixed, and the market competitiveness gradually increases.(Pan&Zhengxuan 2023)

Through the above data, we can see that the audience's attention to animation art and expectations are still relatively high, but from the existing works, we can also find some changes in the watercolor language in the current digital animation production environment. With the change of digital animation production method, the watercolor language must make corresponding changes. And it can also be found that the box office appeal of two-dimensional animation is not as strong as three-dimensional animation. The main reason is that the audience needs stronger sensory stimulation, and the artistic characteristics of two-dimensional animation are destined to be ignored by the market. On the other hand, the artistic characteristics of 2D animation can continue to express the traditional beauty of watercolor language.

With the continuous development and innovation of digital media technology, it has gradually penetrated various fields of social development, including art creation. In the process of integration and innovation between science and technology and information network technology, it can promote the artistic integration development of digital new media technology and animation design. In the current information age, the role of digital media is becoming more and more important, and the influence on film and television animation is also growing. This influence is not only reflected in the process of design and creation, but also in the later broadcast. It is expected that in the future, with the further development of digital media technology, it will provide more technical support for the creation of film and television animation.

In this context, the combination of watercolor art and digital animation production technology has new development opportunities. Therefore, the creative space of animation design and production has become broader, the creation efficiency has improved, and the creation form has become more abundant. However, it also brings some challenges, such as the lack of professional talent, weak innovation and imperfect industrial mechanism.

In the author's view, the combination of watercolor art and animation is a novel and unique exploration path in contemporary art creation. In this fusion, the traditional watercolor painting techniques endow the modern animation works with unique artistic appeal and aesthetic value. In the following, we will explore how to combine traditional watercolor painting techniques to create modern animation and illustrate it by citing practical cases. The application of traditional watercolor painting techniques in creating modern animation can be carried out from two aspects: composition and color. In terms of composition, traditional watercolor painting techniques pay attention to the form of objects, spatial relationships and the overall

feeling of the picture, which is similar to the scene, layout and role positioning in animation production. By learning and drawing on the composition method of watercolor painting, animators can better layout the animation screen and make it more in line with the law of visual aesthetics. For example, the watercolor painting scene in the movie "Valley of the Wind" draws on the perspective and depth of field expression of watercolor painting in composition, which enhances the sense of hierarchy of the overall picture. In terms of color, traditional watercolor painting techniques have brought new expressions to modern animation with their unique shading and color rendering methods. Traditional watercolor painting pays attention to the transparency and overlapping effect of colors, which can be realized by technical means such as layer overlay in animation production. For example, the animated film Fantasy Land uses the color rendering technique of watercolor painting. By superimposing color layers with different transparency, the colors in the picture are richer and more variable, presenting the unique texture of watercolor painting. In addition to composition and color, traditional watercolor painting techniques also provide new ideas for the motion performance of animation. Brush strokes and rendering methods in watercolor painting can make the picture form a natural and flowing visual feeling, which is like the movement of objects in animation. By learning brush strokes and light and shadow rendering in watercolor painting, animators can make characters and objects have more realistic motion in animation. For example, in the animated movie My Neighbor Totoro, the characters and backgrounds in the animation look more natural and organic by borrowing the brushstroke style and rendering method of watercolor painting. In practical creation, animators can combine traditional watercolor painting techniques with modern animation production techniques and use multi-layer rendering and color superposition to achieve watercolor effects. At the same time, suitable watercolor painting techniques can also be selected according to the plot and artistic needs, such as wet painting, dry painting and spray painting. For example, in the animation short film "Aquarium Feelings", the artist uses two watercolor painting techniques: applying color and wet point, which endows the animation with a unique watercolor artistic style through rich colors and special brush effects.

In the author's view, in Howl's Moving Castle, watercolor art is used in character design and scene construction, which gives the film a unique artistic beauty. Character design is an important part of the integration of watercolor art and animation. Firstly, in the character design, watercolor painting skills play a role in shaping the image of the character and increasing the emotional resonance of the character. Miyazaki Hayao used the characteristics of watercolor in character design

to depict the details of the characters' expressions, movements and costumes. The translucent texture of the watercolor makes the character images more vivid and brings a sense of intimacy to the audience. Secondly, the application of watercolor art in character design can also express the personality and emotion of the character through the use of color. Miyazaki uses the techniques of watercolor painting and chooses elegant colors such as lavender and light green to make the characters softer and warmer. The use of color can not only highlight the characteristics of the characters, but also deepen the audience's understanding of the inner world of the characters. In addition, watercolor art also plays an important role in the scene construction. Miyazaki uses watercolor techniques in his films to create a rich variety of scenes, including grasslands, clouds, mountains and other natural landscapes. The use of the wet painting method of watercolor allows the clouds to be painted with a soft sense of layering and haziness, which is like the real clouds. At the same time, when drawing other still life, Miyazaki uses different watercolor techniques to give different objects different textures and enhance the sense of reality of the scene. For the painting of the architectural castle, Miyazaki adopted a series of painting techniques to make the image of the city castle more complex and mysterious. Before drawing the castle, line sketch with a sharp, regular pencil, and slowly paint the texture. Then, the wet painting method was used to spread the large color, with brown as the main color base, and then the details were depicted by color paving. In this process, we should pay attention to the use of clean, transparent colors, different colors should not be mixed and try to avoid the use of white. The use of such techniques gives the castle a rich sense of detail and hierarchy. In addition, the watercolor techniques used in Howl's Moving Castle are relatively rich, and different techniques are used when drawing different still life. For example, when drawing leaves, we still use wet drawing method. But the branches and trunk are painted with a combination of wet and dry to show the soft and hard contrast of the tree. And on the whole, dry and wet collocation can also achieve the effect of different virtual and real, so that the picture is not only more hierarchical, but also contains the virtual and real, near is real, far is virtual, the contrast between virtual and real makes the picture rich and meaningful.

The ways in which watercolor language plays a role in animation scenes are as follows: First, watercolor language can enrich the expression form and connotation of the picture. By using the unique artistic conception, spirit and color charm of watercolor, it can create a special artistic form and atmosphere for the animation scene, to enhance the aesthetic value of the animation works. Secondly, the transparency of watercolor language and the charm of color can effectively create the

relationship between virtual and real in the picture and the sense of space. Animation scenes are mostly static pictures or rotated or scaled. Watercolor language can bring richer texture effects to the scene through the inherent correlation of light and shade of colors and the translation between colors. In addition, the diversity of watercolor language also provides a rich performance space to produce animation scenes. Watercolor painting has different characteristics from other paintings, such as transparency, color charm and object texture. Applying watercolor language to animation creation can bring more artistic effects and enrich the artistry of animation works. Therefore, the role of watercolor language in animation scenes is mainly manifested in enriching the expression language and technique of animation, improving the aesthetic value of animation works, improving the aesthetic taste of animation scenes, and enriching the artistic effect of animation works. (Ding 2016)

With the development of media, technology and other important factors, Chinese digital animation has gradually formed a contemporary artistic wave of "author animation". The formation of author animation stems from many factors: the first is the animation creator's deep complex for painting and love for video expression. In addition, advances in technology, especially the popularity of the Internet, have provided more free and open learning and creation environments for animation authors. Animation, as a medium combining static art and dynamic images, has strong artificial traces and a sense of handwork, which is favored by more and more plastic artists. The variety and inherent creativity of animation makes it an ideal platform for personal expression and experimentation. In addition, the influence of traditional Chinese literator painting spirit on contemporary author animation cannot be ignored, which gives animation a unique Chinese author spirit. In general, author animation is a combination of traditional art and modern technology of animation art revolution. In this revolution, language times and language individuation are fully reflected. Firstly, the performance of language timeliness in the field of animation is reflected in the process of language reconstruction under the influence of technological progress and popular culture. With the involvement of computer technology, animation art absorbs the changes brought by new technology, as well as elements of contemporary multi-culture and popular culture. This timeliness is not only shown in the animation technology, but also reflected in the artistic expression and narrative mode. Contemporary artists incorporate contemporary artistic characteristics and personal symbol system into their animation creation, and make their works have the imprint of The Times by sharing photo libraries and appropriating pictures. The experimental exploration of animation language is to expand narrative possibilities and enhance narrative interest through dynamic rhetoric

and open narrative structure. In addition, the way the author's animation is viewed is also explored from the inside out, reflecting not only the artist's perspective, but also the images generated in the creator's mind. The combination of animation and other art forms, such as drama and modern dance, forms a new type of synesthesia experience, showing the inclusive and diversified development trend of animation language. Secondly, language personalization is significant in the creation of individual animation authors. Their works deeply reflect their unique personal imprint from artistic themes to image styles. The formation of this style is based on the author's technical choice, narrative needs and artistic accomplishment. Personalized expression is prominent in plastic arts, ink use, image style and other aspects, reshaping the characteristics of the art language times, and showing the author's life experience, perception and artistic understanding. From Xu Wei's abstract expressionism to Chen Hongshou's meticulous figure painting, to the different styles of Yangzhou's eight eccentrics, they are all embodiments of the pursuit of individuality. Even under political and social constraints, as in the work of Shanghai Fine Arts Film Studio, the pursuit of individuation is vaguely visible. Contemporary authors convey emotions and interest through "abstract freehand" and "naive and strange harmony", and use brushwork texture as a new language to express emotions, liberate "audio-visual language" from the traditional film and television framework, and endowing animation with unique humanistic value and schema system.(Yipin, 2015)

The main reason for the formation of the above phenomenon is the emergence of new technical language characteristics in the digital age. The characteristics of the new technical language in the digital age are mainly reflected in the following aspects:

1. Digital art rendering and reconstruction: With the arrival of the digital age, the high-tech animation technology has become a reality, especially after entering the new century, this process is accelerated. Digital technology has not only changed the way animation is produced, but also greatly expanded the possibilities for its artistic expression.

2. Technical innovation and innovative expression: new technologies such as digital simulation technology make the language of animation art more colorful. The innovative nature of these technologies became a catalyst for transformation, spawning entirely new animation languages and inspiring creative excitement.

3. Cross-border integration and diversity: The author's animation has shifted from self-narration to cross-border integration, expanding the communication function of language. The compatibility and appeal of this artistic language makes

animation frequently appear in other art categories, reflecting the diversification of contemporary culture and the absorption of popular culture.

4. Visual revolution in the Internet age: the network has accelerated the integration and reproduction of image resources, leading to a "world image era". This not only changes the way images are transmitted, but also redefines the distribution of artistic discourse.

5. Dynamic language and interactivity: The dynamic narrative features and interactive language features of animation are becoming more and more prominent in the digital age. Animation is not only a tool for conveying information, but also an independent art form with bidirectional, non-linear and uncertainty.

To sum up, the new technical language of the digital age is manifested in the field of animation as the innovation and integration of technology, the diversity and depth of expression, and the close integration with the visual culture of the Internet age.(Yipin, 2015)

In the face of the above situation, digital ink and wash animation came into being. Based on inheriting the spirit and aesthetic of traditional ink and wash painting, digital ink and wash animation realized innovation through digital technology. The artistic conception and brushwork of traditional ink painting, integrated with poetry, books, paintings and prints, emphasize the blending of imagery and emotion, and show the profound cultural deposits and historical precipitation of China. The intervention of digital technology not only simplifies the production process of animation, but also strengthens the visual impact and expression of art works. For example, the application of 3D and 8K ultra-high-definition imaging technology makes the Chinese ink animation present more delicate pictures and realistic spatial sense, while retaining the unique hazy beauty and meaning of Chinese ink. Works such as "Autumn Solid" and "Start of Autumn" are examples of the perfect combination of digital technology and art while maintaining the traditional charm. They not only promote the re-innovation of ink animation, but also make this art form connect with The Times in a richer way and touch people's hearts. (Lijun, 2023)

The use of watercolor language to express the connotation of digital animation can also facilitate the integration of animation elements in the local context, mainly reflected in the following aspects:

1. Cultural elements Integration: Chinese animation incorporates rich traditional cultural elements, such as fairy tales, folklore and historical allusions, which are reflected in the animation content, character design and story plot.

2. Aesthetic style innovation: In the global cultural competition, Chinese animation shows a unique aesthetic style. It not only absorbs international advanced

technology, but also integrates local art aesthetics to create a visual style with Chinese characteristics.

3. Reflection of social issues: animation works often incorporate contemporary Chinese social issues, such as environmental protection and urban-rural differences, so as to resonate with the audience and strengthen the social influence of animation works.

4. Technology and media integration: With the advancement of technology, animation is combined with new media technologies (such as VR, AR, etc.) to provide viewers with a more immersive viewing experience.

5. Combination of emotion and reality: animation works often combine real life elements, such as family relationships and personal emotions, to make the works more realistic and enhance the resonance of the audience.

To sum up, the integration of animation elements in the local context not only shows the rich cultural heritage of China, but also reflects the diversity of contemporary society and the development trend of technology. (Xue, 2019)

In general, the current state of development of watercolor art combined with digital animation production technology indicates the continued prosperity and innovation in the field of digital art. Although there are some challenges, the prospects for the development of this form of combination are very optimistic as the technology continues to improve and the market expands. (Huimin, 2022)

In conclusion, the use of traditional elements can enhance the cultural connotation and artistic value of animation works. Through the combination of traditional elements and modern animation technology, animation works can have more characteristics and personality and meet the audience's pursuit of cultural heritage and aesthetic needs. And it can improve the appreciation and communication of animation works. Audiences have a strong interest and sense of identity for traditional culture. Integrating traditional elements into animation works can attract more audience attention and love and improve the communication power of works. For example, the series of Chinese Mysteries shows the integration of traditional cultural elements and modern creative methods. These works not only inherit the traditional artistic style of classics such as Magic Brush Maliang, but also use traditional techniques such as ink painting and paper cutting and combine modern animation techniques to creatively present traditional Chinese stories. This combination reflects the harmonious coexistence of tradition and modernity and shows the flexibility and adaptability of traditional Chinese culture. Through this method, the creators not only retain the spiritual core of traditional culture, but also give it a new significance of The Times, making these works not only have cultural

heritage, but also meet the aesthetic needs of modern audiences. In general, this kind of animation works is the modern reconstruction of traditional cultural symbols, which not only shows the fresh power of traditional culture, but also provides a new direction and inspiration for domestic animation creation.

2.3.2 Visual landscape of watercolor art and digital animation integration

The fusion of watercolor art and digital animation represents an innovative art form and is a highlight in the field of contemporary art. Under the background of the Internet digital media era, watercolor painting art and new media are integrated with each other, which brings unprecedented performance tension for animation film and television art. The audience's artistic perception of watercolor painting has also been significantly improved. (Chenxi&Xiaomeng, 2022)

This fusion is not only reflected in the technical level, but also in the artistic and aesthetic value of a leap. When watercolor is used for film and television creation, the drawing of the movie scene can fully show the characteristics of watercolor painting, and also combine the art of watercolor painting and the aesthetics of light and shadow to the maximum extent. Accurate scene description not only helps to promote the development of the story, but also can render the emotional tone of the animated film, strengthen the viewing experience of the animated film and television works, thus expanding the artistic appeal of the animated film and television works. (Chenxi&Xiaomeng, 2022)

With the development of digital multimedia production technology, the viewing market of TV, film and online mobile media is also expanding rapidly. The explosive growth of economic benefits of film and television makes the relationship between economy and art become more and more close. At the same time, the audience's appreciation level continues to improve, and the expectation of excellent works is also increasing, which motivates the creators to continuously improve the level of animation film and television production and explore new directions of artistic expression. (Chenxi&Xiaomeng, 2022)

As early as 1958, the creation of the cartoon "Nine Color Deer" had begun, interrupted by political changes, and restarted in 1980. The creative team deeply studied Buddhist stories and Dunhuang art, and integrated national cultural treasures into the animation. Co-directed by Qian Jiajun and Dai Tielang, Qian pays great attention to details, highlighting poetry and divinity. In the Dunhuang collection, the team is diligent in sketching and learning the natural posture of the deer, which is reflected in the detailed picture design. After months of hard work and tens of thousands of original paintings and backgrounds, the film was completed in June 1981. Although THE artistic achievements did not receive corresponding honors, the

film prompted many people to understand and fall in love with Dunhuang culture, showing the value of creation. (Chenxi&Xiaomeng, 2022)

Inspired by Dunhuang murals, Qian Jiajun and Dai Tielang integrated traditional culture into animation art in the creation of Nine-Colored Deer. In the modeling design, they draw lessons from the female supporting figure in Cave 61 of Mogao Grotts, so that the role modeling is consistent with the style of ancient murals. In the color design, the animation adopts the color language of Dunhuang mural, showing a unique visual effect. In the action design, the elegant dynamics of the nine-colored deer capture the vivid posture of the animal, showing the author's careful polishing of the action details. In the background design, the creator combines field collection with research, which not only faithfully reproduces the style and appearance of Dunhuang, but also adds innovative elements. The whole work reflects the two directors' modern interpretation of the traditional core of the story, as well as the noble praise of the spirit of love, highlighting the perfect integration of animation and traditional culture. (Chenxi&Xiaomeng, 2022)

Nine-Colored Deer shows the combination of animation and Dunhuang mural style in the use of watercolor. In the animation, the fur patterns of the nine-color deer are simplified by crescent shaped color blocks, rather than the complicated patterns of Dunhuang murals, which is not only convenient for animation production, but also makes the image of the deer vivid and distinct. In the background design, the crew integrates field collection and Dunhuang art research, refines and innovates, transforms mountains and rivers into the boundaries of the story, and absorbs the verve of the murals through the proportional relationship between the characters and the mountains, and creates a surreal poetic space. Overall, the use of watercolor emphasizes the spirit of Dunhuang art, while also adapting to the characteristics of animation as a medium. (Chenxi&Xiaomeng, 2022)

In the author's view, Watercolor art is a painting method that utilizes water as a medium and color as its expressive form, providing rich visual elements for animation creation with its unique texture effects and color expression. In practical animation production, incorporating the texture effects of watercolor art can enhance the texture and expressiveness of animation scenes. Firstly, the texture effects of watercolor paintings can provide a unique visual language for animation creation. Within watercolor paintings, the interaction between water and pigments generates diverse texture effects, such as mottled textures and flowing brushstrokes. These texture effects can endow animation scenes with a distinctive texture and depth, making the images more vivid and realistic. For instance, in the animated film "The Lion King," scene designers cleverly employed the texture effects of watercolor

paintings to depict the magnificent scenery of the African savanna and the texture of animal fur, creating a rich African atmosphere and realistic visual texture. Secondly, the color expression of watercolor paintings can offer a wider range of color choices for animation creation. Watercolor paintings feature bright, vibrant colors that are fresh and natural, possessing strong expressive and emotive qualities. In animation creation, by drawing inspiration from the color expression of watercolor paintings, more diverse and colorful visual effects can be achieved. For example, in the animated film "Big Fish & Begonia," the creative team ingeniously utilized the color expression of watercolor paintings to depict the color changes of the sea, schools of fish, and islands, creating a dreamlike visual effect. Lastly, achieving the texture effects of animation through watercolor art requires attention to several points. Selecting appropriate paints and paper is crucial, as different paints and papers produce different texture effects. Therefore, it is essential to choose suitable materials based on the needs of the animation scenes. Mastering the correct painting techniques is also essential, as achieving the texture effects of watercolor paintings requires certain painting skills, such as controlling water content and mastering brushstrokes. Furthermore, attention should be paid to grasping the overall visual effect of the artwork. When using watercolor art to create texture effects in animation, it is important to consider the overall visual effect of the artwork, ensuring harmony and unity within the scenes.

In 2016, S. E. Montesdeoca, H. S. Seah, and H.-M. Rall proposed rendering 3D animated geometries into watercolor-style animations with artistic guidance control. The core of the system lies in providing a user-friendly watercolor simulation tool, capable of not only emulating the characteristic effects of watercolor but also addressing the real-time performance and artistic guidance requirements. Users can directly paint watercolor effects in object space, achieving immediate local control to achieve desired visual effects. Additionally, the system extends the palette of simulated watercolor effects, allowing for increased flexibility in creation without reliance on previously drawn watercolor images. The system also introduces a range of novel algorithms to simulate specific watercolor effects such as hand tremor, pigment turbulence, color bleed, edge darkening, paper distortion, and granulation. Fully implemented within Autodesk Maya, the system operates in real-time and demonstrates good scalability to complex scenes, showcasing a broader range of stylistic diversity compared to previous systems. By introducing multiple innovative algorithms to simulate key effects of traditional watercolor, including hand tremor, pigment turbulence, color bleed, edge darkening, paper distortion, and granulation, the system embodies typical characteristics of traditional watercolor paintings. It

operates in real-time, scales well with scene complexity, and has been fully realized within Autodesk Maya. By offering artistic guidance capabilities, allowing users to paint simulated effects as needed, the system enables immediate, localized control over watercolor appearance. Furthermore, the system extends the palette of simulated watercolor effects, enhancing the diversity and practicality of the simulation without depending on pre-drawn watercolor images.

The system also introduces a set of specialized watercolor shaders that, guided by artistic directives, allow users to directly depict desired watercolor effects within the three-dimensional scene, achieving simulation of the distinctive appearance of watercolor paintings. These shaders adjust and deform based on the user's drawing inputs, thus controlling and enhancing watercolor effects within the image space. Specifically, the shaders implement a watercolor reflection model, incorporating features such as object-space jitter simulation, pigment turbulence, color bleeding, edge darkening, paper distortion, and granulation, all of which can be finely tuned through artistic guidance. This approach not only addresses the challenges of artistic guidance for watercolor simulation within object space but also opens up new possibilities for future applications and research. Through dedicated watercolor shaders, the system can customize adjustments and deformations according to the user's specific requirements, thereby achieving highly personalized rendering effects (Montesdeoca, Seah, & Rall, 2016).

The clear and beautiful characteristics of watercolor language in digital animation are mainly reflected in the following aspects:

1. Artistic texture: the special artistic attributes of watercolor painting, such as the combination of water and pigments, large-area splay techniques, so that the pigments have fluidity and create a clear artistic effect.
2. Natural beauty: the transparency of watercolor and the mutual infiltration of chroma, showing a mysterious and implicit beauty. The flexible use of watercolor brushes, such as the speed and weight of brush strokes, further enhances the natural beauty and dynamic sense of the picture.
3. Emotional expression: In the light and shadow atmosphere of an animated film, the tone of watercolor can increase the emotional depth and help the story express the theme. Different techniques, such as wet and dry painting, can make the picture rich in color, clear and transparent or form a light and dark contrast.
4. Artistic conception: watercolor is good at depicting the scenery with profound artistic conception, such as hazy rain and ethereal scenery, which enhances the poetic and natural beauty of animation. (Huimin, 2022)

Watercolor art and Chinese ink art are in exasperated, and as a very important Chinese ink animation is also an important part of Chinese animation. In the creation of animation in China, ink and watercolor art are often used in the creation practice at the same time. In the history of Chinese animation art, Te Wei is known as the founder of New China animation art and the "father of ink animation". Te Wei played a key role in the formation and development of Chinese animation school. He combined traditional Chinese art elements with animation and promoted the creation of nationalized animation. Te Wei not only deeply studied Chinese culture, but also actively absorbed foreign advanced technology and ideas, and promoted the modernization of Chinese animation art. His works, such as *Landscape Love*, not only embody Chinese characteristics, but are also internationally recognized and become world animation classics. Te Wei's innovative exploration of animation themes and expression techniques broke through the traditional Soviet realism model and strengthened the self-confidence and cultural identity of Chinese animation. His practical and theoretical contributions have laid a solid foundation for the promotion of the unique style and international status of Chinese animation. In particular, "*Landscape*", a representative work, is a representative work of Chinese animation, because it integrates the essence of traditional Chinese culture into animation art, shows the epitomization of Chinese humanistic spirit, and reflects the Chinese animation "*Landscape*" is a representative work of Chinese animation, because it successfully integrates traditional Chinese culture and animation art. This work not only shows the profound Chinese humanistic spirit, but also shows a high degree of innovation in technology and art. It breaks the traditional Chinese painting concept of attaching importance to landscape and despising characters and realizes the harmonious unity of characters and landscape environment through unique lens movement and character performance. In addition, Te Wei's innovative practice in *Landscape Love* marks an important step for Chinese animation on the road of exploring national cultural confidence. In the international community, "*Landscape*" has also received high praise. It has been praised by many scholars and critics as the representative of Chinese animation, enjoys international reputation, and is listed as one of the 100 classics of animation in the world. The success of this work not only reflects that "*Landscape*" is a representative work of Chinese animation, mainly for the following reasons. First, *Landscape* has successfully integrated traditional Chinese culture into it, becoming the epitome of Chinese humanistic spirit and showing traditional Chinese aesthetic and philosophical thoughts. Secondly, it uses a unique form of ink animation and combines it with traditional Chinese painting to create a unique artistic style. Moreover, the work has been widely recognized and evaluated in

the world and is regarded as one of the classics of animation in the world. In the international community, "Landscape Love" has received high evaluation. It is regarded by many scholars and critics as one of the representative works of Chinese animation and enjoys an international reputation. Through its unique artistic style and profound humanistic connotation, the work shows the charm and uniqueness of Chinese culture, which has been appreciated by audiences around the world. It is the representative of Chinese animation art, which not only has high artistic value, but also has important cultural significance. It conveys the cultural confidence and identity of the Chinese people to the world by displaying traditional Chinese culture and philosophy. Therefore, Landscape is widely recognized as one of the classics of Chinese animation and has established a good image for Chinese animation in the world. (Qijun, 2021)

Te Wei's works reflect the spirit of humanism mainly through reflecting and carrying forward the traditional Chinese culture and national characteristics, showing that Te Wei's works deeply reflect the spirit of humanism, which is mainly reflected in the deep excavation and display of national culture and history in his animation creation. His works not only incorporate traditional Chinese aesthetics in artistic form, such as ink painting style, but also deeply explore Chinese historical stories and folklore in content, which are an important part of the Chinese humanistic spirit. In this way, Te Wei's works provide rich materials and inspiration for the construction of Chinese socialist culture and strengthen the national identity and pride for Chinese traditional culture. In terms of ethnic identity, Te Wei's works enhance the audience's understanding and respect for ethnic characteristics by showing unique Chinese elements, such as traditional costumes, architecture, and customs. His works have not only been widely praised at home, but also demonstrated the unique cultural charm of China internationally, promoted the international dissemination of Chinese culture, and enhanced China's cultural soft power. In general, Te Wei's works have played a positive and far-reaching impact on promoting the spirit of humanism, promoting the construction of socialist culture, and strengthening national identity. (Qijun, 2021)

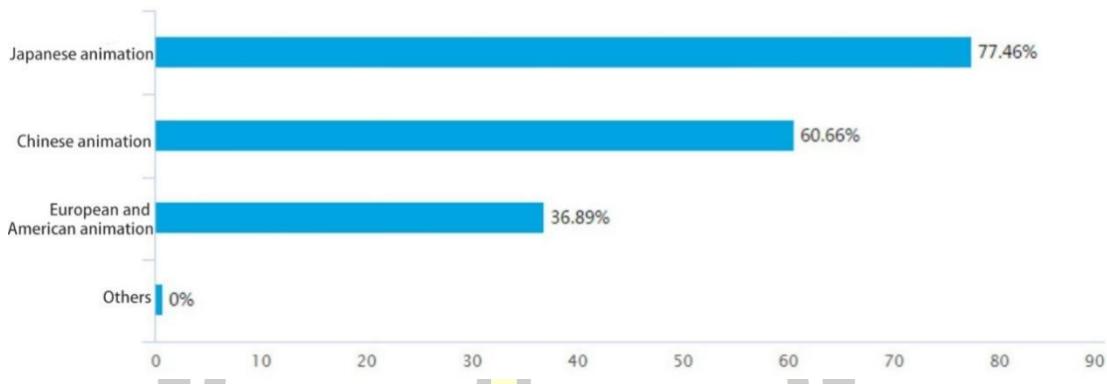


Figure 24 The factors for lack of popularity of Chinese animated films.

Source: (Geng, 2017)

Facing the change of the world animation pattern, China must take its own national road to develop local animation and find a unique style of work. As an important part of traditional culture of our country, watercolor art is the art element that digital animation needs urgently. In the survey on "which country and region's animation are preferred by the audience", the proportion of people who like Japanese animation is the highest, followed by domestic animation and European and American animation, which shows the huge influence of Japanese animation on the audience of Chinese animation today. (Geng, 2017)



Figure 25 Country and region's animation the audience prefers

Source: (Geng, 2017)

According to the survey data on "Shortcomings of domestic animation", we can clearly find that Chinese animation audience's cognition of Chinese animation: low quality, bad story, too naive, bad drawing style and other animation content are the most prominent problems, which need to be paid enough attention.

In short, the clear beauty of watercolor animation is reflected in its unique artistic texture, natural beauty, emotional expression and artistic conception performance, which brings unique visual and spiritual experience to the audience.

2.3.3 Digital animation interpretation of watercolor language connotation

The interpretation of watercolor language by digital animation is a deep artistic exploration. In the field of contemporary art, image watercolor, with its rich and unique artistic expression language, interprets the living state of social people and the expression of spiritual emotions, and brings people fresh and new artistic visual effects and spiritual enjoyment. The aesthetic value of the application of watercolor artistic effects in animation is mainly reflected in the following aspects: First, it shows a simple and elegant artistic style. Watercolor animation creates an ethereal and fresh visual experience with its unique simple and elegant style, and the use of this style makes the animation work present a transparent and pure aesthetic sense. Secondly, it provides rich cultural connotation. The application of watercolor art in animation is not only a visual innovation, but also a deepening of cultural level. It combines the symbolic meaning and cultural connotation of traditional watercolor and conveys the profound cultural atmosphere and aesthetic artistic conception to the audience through the modern medium of animation. Third, to build a bridge of emotional resonance, the use of watercolor artistic effects in animation, to establish the emotional connection between the creator and the audience. Whether it is an idealized depiction of real life or an artistic abstraction of objective things, watercolor effects can effectively convey emotions and ideas. Finally, it becomes the driving force of aesthetic education. The application of watercolor effect in animation has a positive impact on the popularization of aesthetic education of animation. It not only enhances the audience's ability to appreciate art, but also promotes the popularization and improvement of aesthetic appreciation. In summary, the use of watercolor artistic effects in animation not only enriches the visual performance of animation, but also deeps its cultural value and aesthetic significance, making the animation works have been significantly improved in terms of artistic and cultural depth. (Zixi, 2022)

Watercolor effects are usually used in the animation of the following technical methods:

1. Wet painting color connection technique: imitate the wet painting color connection method in traditional watercolor painting and use digital tools to simulate the penetration effect of watercolor when it is wet and wet, so that different colors form a natural mutual permeability texture.
2. Simple line outline: use simple lines to outline the object, reduce the description of details, and emphasize the freshness and elegance of the picture.
3. Watercolor decorative elements: many watercolor decorative elements are used in art design to create a plane visual effect with brilliant colors and smooth lines.

At the same time, the line structure of traditional decorative paintings is retained to enhance the visual appeal of animation.

4. Deep integration of digital media technology: Combined with the development of modern digital media technology, the artistic effect of watercolor and animation production technology is innovatively integrated, so that the animation works not only retain the artistic characteristics of watercolor, but also show the innovation of digital media. (Zixi, 2022)

These technical techniques not only make the animation works more visually rich and attractive, but also enhance the cultural connotation and aesthetic value of the works. (Zixi, 2022)

With the development of digital multimedia production technology, the generation of digital animation makes the application of 3D animation, CG virtual effects, digital graphics and animation synthesis technology more widely, subverting the essence of traditional animation images. In this context, the interpretation of watercolor language by digital animation is particularly important. Taking the 3D animation short film "New Three Forks" as an example, this paper tries to link the production of digital animation and the characteristics of animation ontology, and clarify the multiple and variable relationship between digitization, animation and nationalization.

Specifically, digital animation can learn from the techniques and color application in watercolor painting, and integrate color, light and shadow, lines and other elements in watercolor painting into digital animation, so that the animation works have stronger artistic and ornamental. At the same time, digital animation can also use the advantages of computer technology to make some of the difficult effects in watercolor painting more intuitive and vivid. For example, the ink rendering effect, wetness, etc. in watercolor painting can be better presented by digital animation technology.

There are many characteristics of digital animation communication, the most important of which is interactivity. An important feature that distinguishes digital animation art from traditional art is "interaction". People go to the art gallery to appreciate the painting, sit in front of the TV to watch the animation, perhaps will be moved by the art world presented in the painting, evoking his relevant memories, feeling a rush of emotion; Perhaps you are not satisfied with the form and content of your work and want to modify or supplement it. The birth of the computer has changed this one-way transmission mode. The computer itself is a two-way device with input and output systems at the same time. In the face of massive program content in the Internet, the majority of animation enthusiasts can not only arbitrarily

order their favorite programs on the network, And can according to the need of the mouse, the keyboard lamp to pause, forward, backward and other control of the program showing process, so that the animation is free from the shackles of the timeline, and even can start from different places, different places to produce branches and lead to different endings. In addition, the biggest difference between digital media art and past art is the rich expression form. Digital media is more the use of modern information technology to create film and television animation, whether it is the image processing of film and television animation, sound processing or later broadcast form, digital media has played a huge role in these links. Therefore, using the advantages of digital animation is also an effective way to let more people understand watercolor art.

According to the survey on "whether animation can help broaden their horizons", more than 32.79% of the 244 people think that watching animation can help them broaden their horizons, expand their knowledge and understand cultural customs. 65.57% of the audience said it helped a little; Only 1.64% think that it is not helpful at all. The audience's thirst for knowledge is one of the important motives for watching animation. (Geng, 2017)

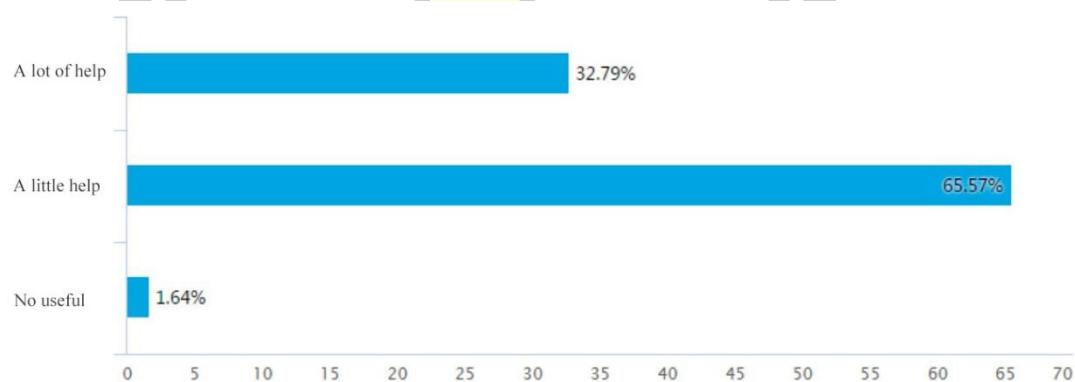


Figure 26 The effectiveness of animation for expanding your horizons.
Source: (Geng, 2017)

In the author's view, watercolor art is a traditional form of painting known for its unique color and water control techniques. Animation creation is an important part of modern film and television art. It creates dynamic visual effects through continuous image playback. Although there are great differences between the two in the form of expression and creation methods, they can learn from each other and integrate to create more expressive and innovative art forms. In the use of animation technology to enhance the expression of watercolor art, can be achieved by the following ways:

1. Digital scanning and color reduction technology. Modern digital technology can realize accurate scanning of watercolor works, convert them into digital images,

and then restore and adjust the color. Through this technology, watercolor works can be more clear and vivid presentation, and at the same time, color adjustment and special effects processing can be easily carried out to enhance the expression and visual effect of the picture. For example, in an animated film, the production team used digital technology to scan the watercolor with high precision and carried out some special effects on the basis of color restoration, so that the texture, color and dynamic effects of the watercolor were well presented, bringing an excellent visual experience to the audience.

2. Dynamic effects and scene design. All kinds of dynamic effects and scene design are often used in animation creation, and these technologies can also be used in watercolor art creation. For example, by adding dynamic effects, we can make watercolor works present more vivid and natural visual effects. And through the scene design, it can create a richer, three-dimensional picture layer sense. In a watercolor work, the painter uses dynamic special effects and scene design technology to dynamically process the elements such as water flow, clouds and characters in the picture, which makes the whole picture more vivid and natural, and enhances the visual impact and expression of the picture.

3. Synthesis and post-processing technology. The synthesis and post-processing techniques commonly used in animation creation can also be used in watercolor art creation. Through the synthesis and post-processing of watercolor works, richer and three-dimensional picture effects can be created. For example, by synthesizing different watercolor works, a richer and three-dimensional sense of picture hierarchy can be created. And through the post-processing technology, you can enhance the color of the picture, light and shade and other effects, making the whole picture more vivid and natural. In a watercolor work, the painter uses the synthesis and post-processing technology to synthesize different watercolor works, and carries out color adjustment and shading processing operations, which makes the whole picture more vivid and natural, and enhances the visual impact and expression of the picture.

It is found that watercolor language has the following unique aesthetic values in digital animation creation: first, watercolor can create unique artistic conception and art form through its transparency and color charm. The characteristics of watercolor make the animation scene can better show the artistic form and atmosphere and improve the aesthetic taste of the animation. Secondly, the diversity and rich performance space of watercolors enrich the artistic effect of animation works. The use of watercolor language provides a rich expression space to produce animation scenes, making the animation more artistic sense and creativity. In addition,

watercolor painting can create a moisture texture and texture effect of color light and shade intrinsic correlation. By using watercolor techniques, the animation scene can present rich color levels and texture effects and enhance the three-dimensional sense and visual enjoyment of the picture. Finally, watercolor painting can show the fusion of water and color, creating the effect of haziness, the relationship between virtual and real, and the sense of space. The unique charm of watercolor makes the animation scene have a higher artistic expression and improves the aesthetic value of the animation works. (Ding, 2016)

The application of watercolor art style in digital animation art setting also plays a very special role and is reflected in many aspects. First, the technique of watercolor can be used for scene rendering to create a picture rich in artistic conception and emotional appeal. This style is suitable for flat painting, dyeing and other rendering methods, making the scene both clear and transparent and showing light and dark contrast, increasing the charm and depth of the picture. In animated films, watercolor style can enhance the tone and emotional expression of the shot, and help the story better highlight the theme. Watercolor style also has a place in the line design of animated characters and scenes, especially in 2D animation. Its natural and random characteristics make it suitable for dramatic and narrative film types. In addition, the fluidity of watercolor colors adds vividness to the frame-by-frame animation, making the characters and scenes change as the animation moves. To sum up, watercolor style not only enriches the expression and artistic language of shooting, character modeling and scene drawing in the 2D animation art setting, but also enhances the overall art style and artistic aesthetic value of the animated film. The application of this style provides more space and possibility for the nationalization development of animation. (Huimin, 2022)

When it comes to the use of animation art to show the aesthetics of watercolor, we must mention Hayao Miyazaki. Miyazaki Hayao's use of watercolor in animation is mainly reflected in the following aspects: First, Miyazaki Hayao uses watercolor techniques to show the background of the picture. In his animation works, the background color transitions naturally, and the texture and color blocks superimposed on each other generated by the penetration of pigments form a unique picture effect. This form of watercolor makes the picture more vivid and soft and can bring a natural feeling to the audience. Secondly, Miyazaki uses watercolor techniques to depict the characters. He uses the way of hand painting, the character lines are simple and bright, full of the breath of innocence. The soft transition effect of watercolor makes the figure more three-dimensional, but also expresses the love of life and nature. In addition, Miyazaki skillfully uses watercolor techniques to deal with the feeling of the

picture, spatial relationships and rhythm. The characteristics of water and watercolor picture feeling, space processing are inextricably linked, Hayao Miyazaki's animation through the watercolor rendering method, makes the picture more layered, enhance the audience's viewing experience. In general, Miyazaki uses watercolor art skillfully in his animation creation. He uses watercolor techniques to represent the background of the picture, depict the image of the characters, and deal with the feeling of the picture, the spatial relationship and the rhythm, so that his animation works have a unique artistic beauty and natural charm. Miyazaki Hayao's watercolor animation art created the expression form of the integration of watercolor and animation, which had a profound influence on the later animation artists. (Weiwei, 2017)

Miyazaki Hayao, through his unique artistic approach, not only opened a new era of the use of watercolor in animation, but also influenced the development of the entire Japanese animation industry, demonstrating the Oriental aesthetic and emotional expression under watercolor. The artistic characteristics of Miyazaki Hayao's watercolor animation are mainly reflected in the following aspects:

1. Natural and real performance: Hayao Miyazaki's animation background uses a lot of watercolor techniques to make the color of the picture transition naturally, showing the beautiful and real natural landscape. The pure color and penetrating effect of watercolor bring a unique beauty and depth to the animation.
2. Lively depiction of characters: Hayao Miyazaki uses hand-drawn method in the design of animated characters. The lines are simple and bright, which form a bright visual effect with the soft contrast of the background.
3. The use of wet painting method: Miyazaki uses wet painting method to create soft transitions of light, shadow and color when drawing elements such as sky and forest, which enhances the three-dimensional sense and dynamic beauty of the picture.
4. Showing Oriental aesthetics: Miyazaki Hayao's watercolor animation is not only a display of technology, but also contains respect for nature and innocence, reflecting the natural aesthetic philosophy of Oriental culture.
5. The combination of art and life: his works are not only the display of art, but also the artistic distillation of the beauty of life, reflecting the respect for life and humanistic care. (Weiwei, 2017)

Using watercolor language, Miyazaki Hayao's animation art not only creates a unique sense of visual beauty, but also reflects the profound humanistic care and the praise of natural beauty. The watercolor language in Miyazaki Hayao's animation shows a unique visual aesthetic, which is mainly reflected in the following aspects: First, the purity and natural transition of color. Miyazaki Hayao uses the fresh and

elegant characteristics of watercolor to create a natural transition of color visual effect. This use of pigments that permeate each other creates a unique visual experience of texture and color blocks superimposed. Secondly, the picture is clear and sound, the lines in the animation are simple and bright, and the background drawing is combined with the wet painting method, especially when depicting the sky, forest and other natural landscapes, showing the soft transition effect of watercolor, bringing the audience the feeling of "this is nature". Thirdly, the reflection on the natural aesthetic philosophy of eastern culture. Miyazaki Hayao's watercolor animation is integrated into the respect and pursuit of nature and childlike innocence of Eastern culture. Through its special artistic expression form, it expresses the love for nature and respect for life. Finally, with the ingenious combination of animation and watercolor, Miyazaki Hayao's works show the perfect integration of watercolor and animation art, using the unique screen tension and spatial processing of watercolor to create animation art with a sense of depth and rhythm. (Weiwei, 2017)

To sum up, using watercolor language, Miyazaki Hayao's animation art not only creates a unique sense of visual beauty, but also reflects a profound humanistic care and the praise of natural beauty.

The animated historical feature film *Chang 'An Thirty Thousand Miles*, which will be released in 2023, shows some unique aesthetic pursuits: The method of "painting Tang by Tang" provides a credible and reliable animation structure for the Tang Dynasty, and creates a double-line intersecting narrative to present the image of Li Bai in Gao Shi's memory. The two poetic styles and life paths are observed through Tang poems and people, and the tragedy of the Tang Dynasty's weather from prosperity to decline is revealed in the double text. Despite the shortcomings of the film, such as "suppressing Li Yanggao", it still carried out an integrated attempt on the animation configuration of the peak of the Chinese civilization history and took a pioneering step for the future narration of the Chinese civilization history of Chinese animation. Through the method of "painting Tang by Tang", this animated film successfully creates a realistic atmosphere of the Tang Dynasty with the help of Tang Dynasty visual elements, such as Tang Dynasty paintings, murals, terracotta figures, etc. The watercolor art in the film is manifested in the delicate depiction of the geography, folk customs and customs of the Tang Dynasty, such as the vivid presentation of the scenes of Yunshan City, Chang 'an, Yangzhou and the Yellow Crane Tower, which are realized by the skills of watercolor art. The fluency of watercolor and the sense of color hierarchy bring the audience a visual experience like experiencing the heyday of the Tang Dynasty. At the same time, the animation beauty in the film also reflects the specialties of watercolor art. For example, the image

shaping of Li Bai and the performance of poetic pictures are all through the means of watercolor art, showing the literary atmosphere and emotional depth of the prosperous Tang Dynasty. (Yichuan, 2023)

In short, the application of watercolor language in digital animation creation has unique aesthetic value. It enhances the artistic effect and aesthetic taste of the animation scene through the characteristics of transparency, color charm and object texture, enriches the expression language and technique of the animation, and makes the animation work more artistic and creative.

2.4 Related research

The research on the application of watercolor art in digital animation creation currently has a relatively broad impact on the global scale. For example, in the animated film "Thirty Thousand Li of Chang 'an" released in the summer of 2023 in China, watercolor art plays an important role in this animation work, especially in the animation and visual art works that convey "Chinese style". Through the modern transformation and innovation of traditional techniques of ink painting, artists can show the spirit of Tang Dynasty poetry and traditional culture in novel ways. This combination of tradition and modernity not only shows the profound connotation of Chinese culture, but also shows the vivid vitality of culture. The use of watercolor, especially in the simulation of silk, multi-layer cloth structure and ink effect, not only improves the visual effect of the animation, but also makes the work more vivid and more cultural characteristics. The development and application of these technologies reflect the artists' deep understanding of traditional Chinese symbols and the exploration of modern expressions, making the works have both profound cultural connotations and a wide range of modern audience identity, and become a cultural bridge connecting ancient and modern, east and west. (Tu&Yan, 2023)

In the digital age, the key for artists to realize the sustainable development of watercolor art is to integrate traditional and modern technology and innovate artistic expression forms. First, artists need to break out of the framework of traditional watercolor art and use digital media technology to explore new creative methods. Digital technology enables artists to integrate multi-dimensional sensory experience in their works, break the physical boundaries, and create three-dimensional, dynamic, sound and touchable watercolor works of art, providing immersive aesthetic experience for the audience. Secondly, artists should improve their own aesthetic ability, reflect on the double-sided nature of science and technology, and pay attention to the integration of watercolor language and The Times, so that their works are full of new vitality. In addition, artists can digitize traditional painting techniques to build an information database and improve the efficiency of creation. Finally, using digital

platforms such as the Internet, artists can disseminate and display their work more widely, increasing the accessibility and impact of their work. In these ways, artists can promote the innovation and sustainability of watercolor art in the digital age. (Xiang&Zhang, 2022)

In China, watercolor artistic expression in the creation of digital animation is like ink and wash animation, while ink and wash animation generate aesthetic meaning through the interaction of materials and forms, mainly relying on the following aspects:

1. The combination of ink and rice paper: ink animation uses traditional ink and rice paper as the main materials. The combination of the shades of ink and the texture of rice paper forms a unique visual effect. The use of this material not only inherits the characteristics of traditional Chinese art, but also gives the animation a flavor of Oriental aesthetics.

2. Strokes and techniques: In Chinese ink animation, artists use various strokes (such as center, side, forward, reverse) and techniques (such as dyeing, rubbing, breaking ink, dialing ink, etc.) to express the dynamic and static beauty through the intensity of ink, the thickness and fluency of lines. The use of these strokes and techniques makes the image in the animation have a sense of movement, but also do not lose the charm of ink painting.

3. Processing of space and time: Ink painting animation is unique in dealing with space and time. It is not restricted by the traditional Western perspective method and uses the "scatter perspective" method of Chinese painting to create a sense of flowing space. At the same time, by controlling the time rhythm of the animation, the artist can better express the theme and emotion of the animation.

4. Implication and imagination: Ink animation emphasizes the transmission of implication and stimulates the audience's imagination and emotional resonance through techniques such as whitespace, implication and symbol. This way of expression reflects the profound meaning and meaningful philosophy of Chinese art. To sum up, through the unique selection of materials, exquisite brushwork skills, special treatment of space and time, and profound expression of meaning, ink painting animation has formed a unique artistic style with Oriental aesthetic characteristics. (Wang, 2023)

In the aesthetic research of watercolor animation, the principle of "persistence of vision" is the key to analyze the time characteristics of animation. The principle is based on the ability of human vision to temporarily retain images, so that the continuous playback of the static picture to form a smooth animation effect. In watercolor animation, this principle makes the animation frames visually transition

smoothly, creating a continuous and natural dynamic feeling for the audience. Through "visual persistence", watercolor animation effectively strengthens the space-time expression of animation. Using the extension of the picture in the timeline, the animation creates a coherent visual narrative that enhances the fluidity and emotional expression of the story. Especially in the style of watercolor, this method not only retains the meaning and aesthetics of traditional water and watercolor, but also shows richer expressiveness and deep aesthetic pursuit through dynamic elements. At the same time, time control and screen rhythm in watercolor animation are also important aspects of the application of "persistence of vision" principle. By controlling the presentation timing and order of each frame, animators can create a sense of rhythm between different scenes, keeping the audience's attention on the main elements while removing unnecessary distractions and strengthening the subject representation and emotional transmission. To sum up, the principle of "visual persistence" in watercolor animation is not only a technical means to achieve dynamic visual effects, but also an important method to deeply explore and convey the aesthetic characteristics of watercolor animation. (Wang, 2023)

Nowadays, the rapid progress of artificial intelligence technology has greatly reduced the technical barriers of artistic creation. Artists can complete excellent watercolor works through AIGC technology without formal learning of watercolor art. And some people who have not studied animation can produce satisfactory animation works with the assistance of AIGC technology. The application and development of specific AIGC technology in animation creation is manifested in several key aspects: First, it assists artists to deal with the tedious work in creation, such as automatic rendering and character design, through machine learning and big data analysis. Secondly, AIGC technology can learn and imitate the creative methods of human artists, and even generate creative ideas and ideas beyond human imagination. In addition, with the advancement of technology, AIGC has been widely used in the field of animation, expanding from traditional animation production to more complex tasks such as character motion capture and emotional expression simulation. However, the application of this technology also poses some challenges, especially in terms of intellectual property rights and data usage. Because the generation of AI animations relies on learning from many existing graphics and data, there may be copyright and data privacy issues involved. In addition, due to the imperfect laws and regulations, the public's distrust and concern about the application of AI in animation creation is also a problem that cannot be ignored. In general, the development of AIGC technology in the field of animation creation shows a trend of high efficiency and

intelligence, and at the same time, attention needs to be paid to solving the accompanying legal and ethical challenges.(Zhang, 2023)

The application of artificial intelligence technology in the field of painting is mainly reflected in the following aspects: First, artificial intelligence can quickly generate a basic design framework by analyzing a large amount of data and pictures, which can help artists efficiently complete the preliminary creation. It can change the color, composition, style of the material, quickly generate different presentation methods, and improve the efficiency of creation. Second, AI illustration can generate many works, but it is unable to understand the deep needs and preferences of humans. Therefore, the unique style, creativity and emotional expression of the illustrator are still irreplaceable. At the same time, artificial intelligence technology is also learning the experience and law of human art and can generate fresh inspiration and artistic ideas beyond human imagination. Finally, the art creation led by artificial intelligence is a social experiment, which improves the ability of perception, decision-making, and knowledge acquisition, and at the same time forms a collaboration with human artists to jointly promote the development of art creation. Although AI has many advantages in the field of painting, its understanding ability, emotional expression and customization are still limited compared with human artists. Therefore, the combination of artificial intelligence and human artists is seen as a major trend in future art creation. (Liqun, 2023)

The changes of artificial intelligence technology to art creation and production methods are mainly reflected in the following aspects: First, the intelligence of art creation tools. The application of artificial intelligence technology enables artists to use advanced software and algorithms to create in a more efficient and innovative way. For example, AI painting techniques can analyze large amounts of data to help artists quickly construct a design framework. Secondly, content generation, artificial intelligence can not only provide rich creative materials, but also produce content mechanically, which greatly improves the creation efficiency. Thirdly, the human-computer collaborative creation process, the combination of human artists and artificial intelligence tools makes the two sides complement each other's advantages and jointly complete creative tasks. For example, artificial intelligence assists in repetitive and tedious work, while artists focus on creative and strategic tasks. Finally, the fusion of virtual and real characters is not only reflected in the scene creation, but also involves the combination of virtual and real characters, which opens up new forms of artistic expression. Therefore, AI technology not only changes the tools and processes of artistic creation, but also expands the field and possibilities of artistic expression. (Liqun, 2023)

2.5 Research framework

The study has identified two main dependent variables, namely the research value of watercolor language and digital animation. Subsequently, a more in-depth analysis is conducted around the primary independent variables for each.

Through investigation, the key factors influencing the variation in the "research value of watercolor language" include aesthetic changes, the intervention of new technologies, the characteristics of watercolor language, and the role of watercolor in culture.

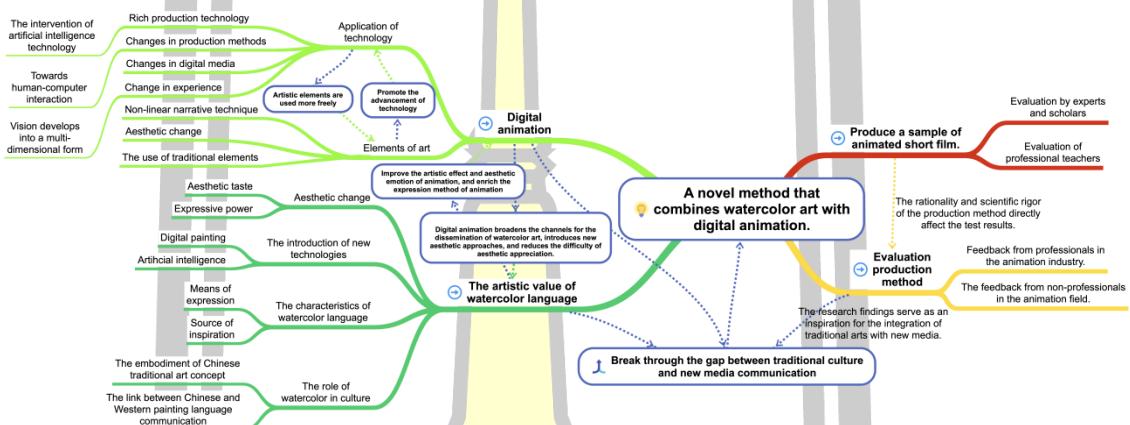


Figure 27 The research framework

The primary factors influencing the variation in "digital animation" are analyzed from two perspectives: Elements of art and Application of technology. The independent variables in the Elements of art aspect mainly include the use of traditional elements, aesthetic changes, and non-linear narrative techniques. In the Application of technology aspect, the independent variables primarily include rich production technology, changes in production methods, changes in digital media, and changes in experience. In summary, Elements of art can promote the advancement of technology, and Application of technology allows artistic elements to be used more freely.

The overall preliminary research results indicate that the expression of watercolor language can improve the artistic effect and aesthetic emotion of animation, enriching the expression methods of animation. Simultaneously, digital animation can address the shortcomings in watercolor art research within the academic circles and complement its inadequacies. Combining both can bridge the gap between traditional culture and new media communication, aiming to break through this divide. Therefore, this research provides a novel method of using watercolor for new media communication.

Chapter 3

Research methodology

The primary objective of this chapter is to design a research methodology that aligns with the goals of this study, achieving the research objectives of the entire project in a phased manner. A mixed-methods approach will be employed, incorporating case studies, in-depth interviews, and questionnaire surveys. In the first phase, the focus will be on exploring ways to enhance the expressive capabilities of watercolor language in digital animation production. Subsequently, a model will be proposed, and this model will be used to create samples. Finally, the new method will be evaluated based on the results obtained from the samples.

3.1 Research design

There were 3 phases of research which consists of (1) the expressive capability of watercolor and animation, (2) the exploration of animation methods, and (3) the test of watercolor animation effects, as shown in figure 28.

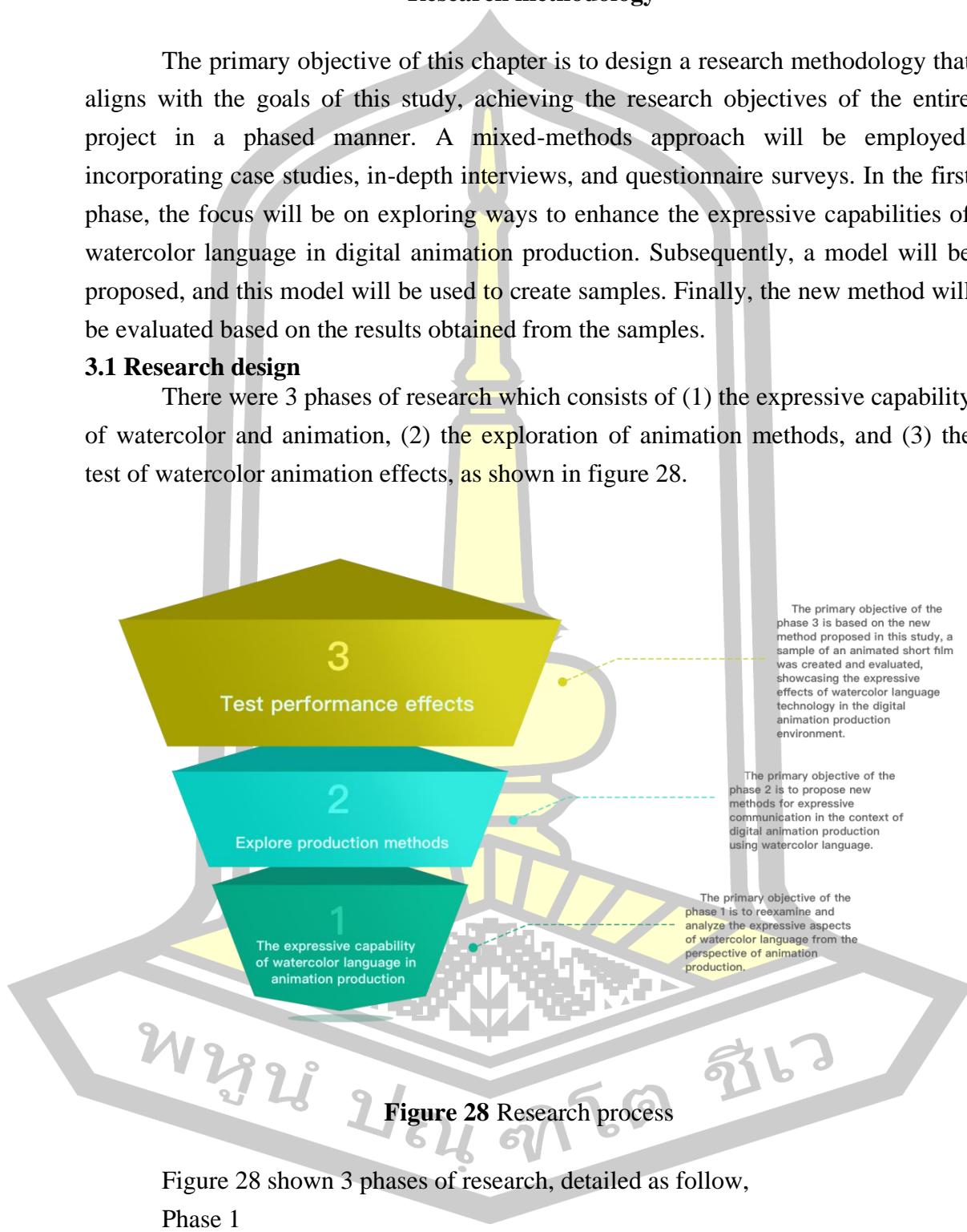


Figure 28 shown 3 phases of research, detailed as follow,

Phase 1

The primary objective of the phase 1 is to reexamine and analyze the expressive aspects of watercolor language from the perspective of animation production. This involves employing a blended research approach to understand the

factors that allow watercolor language to maximize its expressive potential in the creation of animations. This phase's name called "The expressive capability of watercolor and animation".

Phase 2

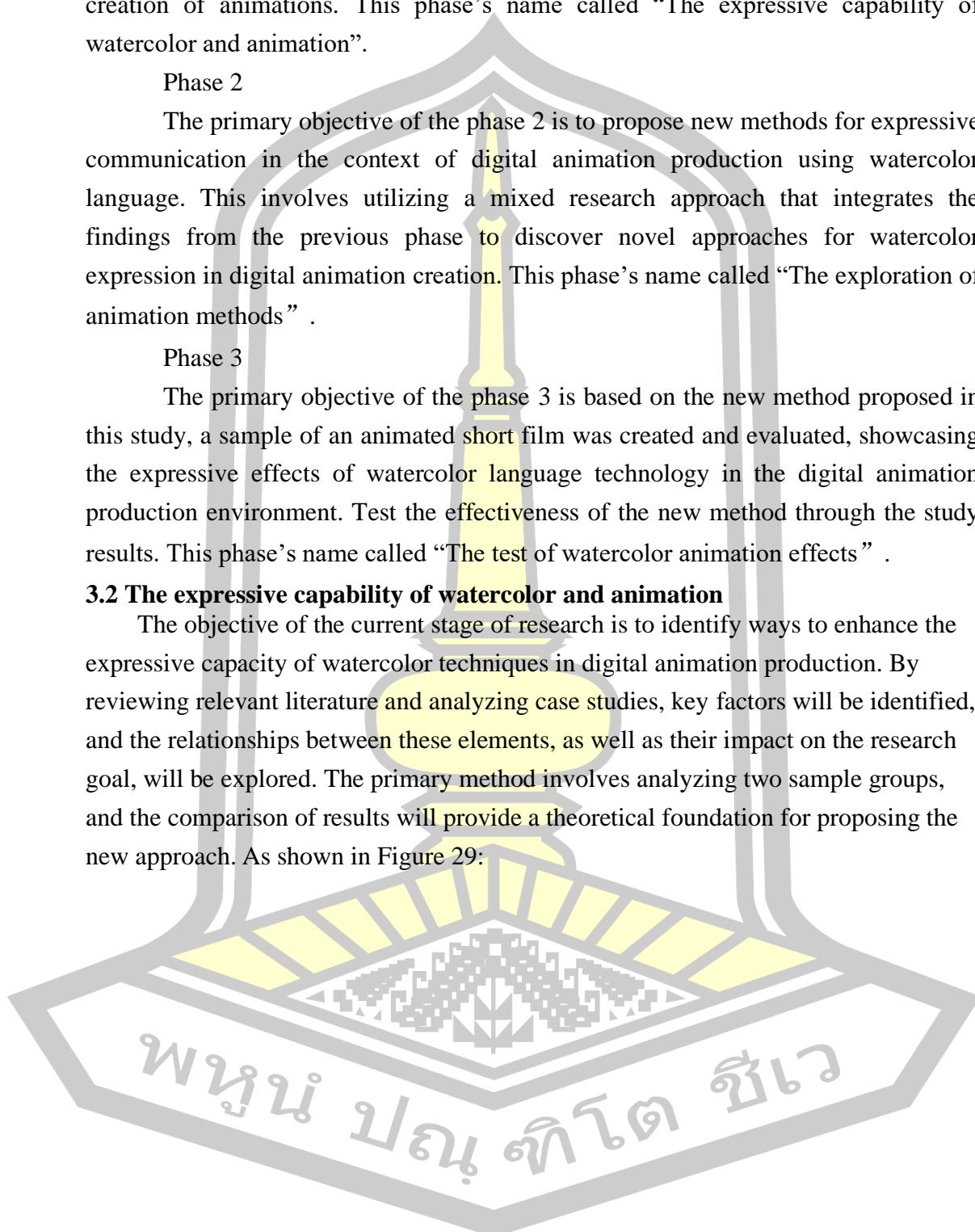
The primary objective of the phase 2 is to propose new methods for expressive communication in the context of digital animation production using watercolor language. This involves utilizing a mixed research approach that integrates the findings from the previous phase to discover novel approaches for watercolor expression in digital animation creation. This phase's name called "The exploration of animation methods" .

Phase 3

The primary objective of the phase 3 is based on the new method proposed in this study, a sample of an animated short film was created and evaluated, showcasing the expressive effects of watercolor language technology in the digital animation production environment. Test the effectiveness of the new method through the study results. This phase's name called "The test of watercolor animation effects" .

3.2 The expressive capability of watercolor and animation

The objective of the current stage of research is to identify ways to enhance the expressive capacity of watercolor techniques in digital animation production. By reviewing relevant literature and analyzing case studies, key factors will be identified, and the relationships between these elements, as well as their impact on the research goal, will be explored. The primary method involves analyzing two sample groups, and the comparison of results will provide a theoretical foundation for proposing the new approach. As shown in Figure 29:



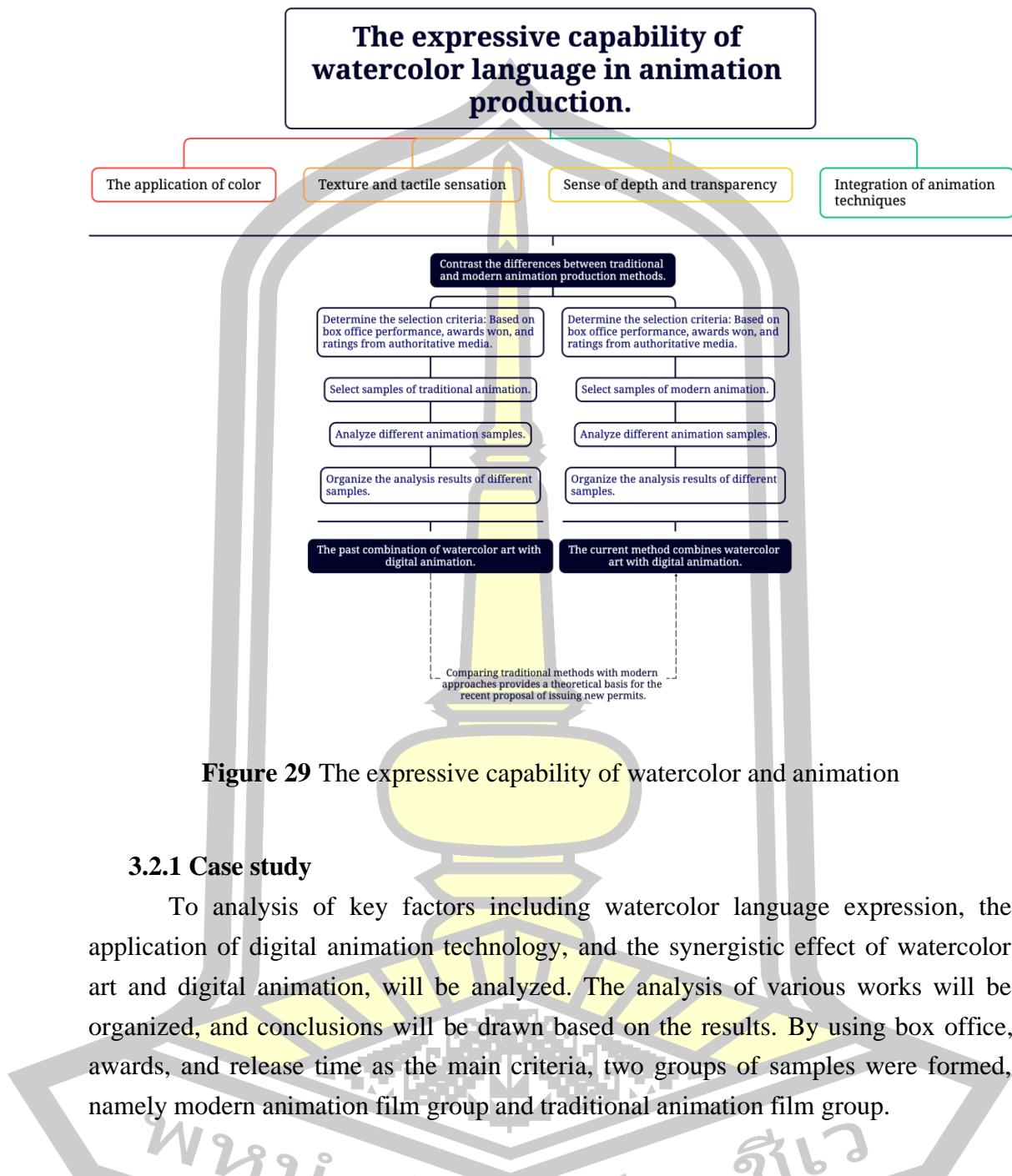


Figure 29 The expressive capability of watercolor and animation

3.2.1 Case study

To analysis of key factors including watercolor language expression, the application of digital animation technology, and the synergistic effect of watercolor art and digital animation, will be analyzed. The analysis of various works will be organized, and conclusions will be drawn based on the results. By using box office, awards, and release time as the main criteria, two groups of samples were formed, namely modern animation film group and traditional animation film group.

There were 2 groups of case study for this step included of:

1) Modern animation' group

Determine sample selection criteria: comprehensive ranking of animations in the past five years through analysis of factors such as box office performance, awards, authoritative media ratings, etc., via official media channels. Identify influential works as analysis samples.

For this research, there were 3 animated films: The Nine-Colored Deer, Monk and the Fish, The Tale of Princess Kaguya.

2) Traditional animation' group

Determine sample selection criteria: conduct a comprehensive ranking by analyzing factors such as box office performance, awards, authoritative media ratings, etc., of traditional animation through official media, to find influential works as analysis samples.

For this research, there were 3 animated films: The Big Bad Fox and Other Tales, Wolf Walker, Boy, Mole, Fox and Horse.

3.2.2 Instrument for data collection

The data is collected from a selection of representative digital animation works from different countries and periods, mainly divided into two main categories: modern animation (in the past five years) and traditional animation.

3.2.3 Method of data collection

The main method employed is case analysis, through which data is gathered and subsequently categorized, organized, and stored. The primary objective of the first phase is to propose new production methods and gather theoretical foundations. The data collected serves as the basis for devising these new methods.

3.2.4 Method of data analysis

The content analysis method is employed to analyze and summarize the differences between traditional animation production methods and digital animation production methods. This analysis aims to identify the theoretical basis for extracting factors that will support the subsequent proposal of a new model. The data analysis work will adopt a hybrid analysis approach, including the following steps:

Using qualitative research methods, analyzes and summarizes the important variables obtained from the previous chapter.

After analyzing the two groups of samples, found the results of analysis of watercolor language expression in animated films.

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3.3 The exploration of animation methods

The primary research objective of this stage is to propose a new production method by validating the findings of the previous phase through in-depth interviews with experts. This process will involve reorganizing the relationships between the main dependent and independent variables based on the experts' feedback, thereby enhancing the credibility of the new model. Additionally, this stage will lay the groundwork for the subsequent research tasks.

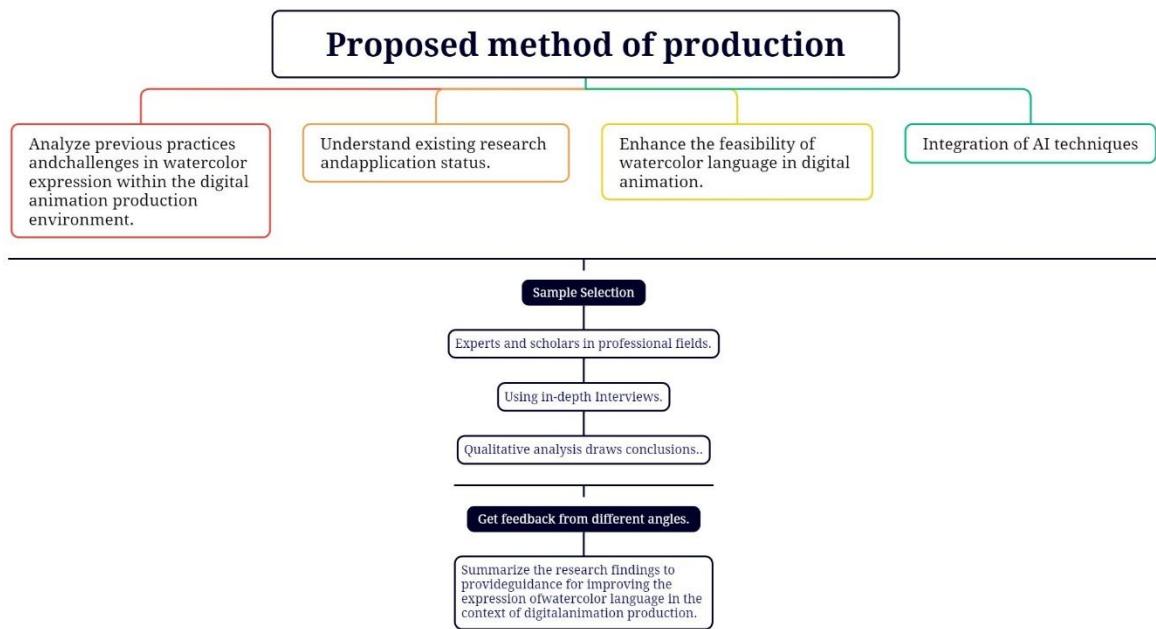


Figure 30 The exploration of animation methods.

3.3.1 Participants

In the second stage, representatives will be selected to evaluate the design methods on behalf of the group. The key information sources will be divided into two groups, totaling 10 people. In this process, non-probability techniques will be used for purposive sampling selection, as follows:

1) Information Source (Evaluation) Group

The subjects of this study are experts and scholars from influential universities and art associations in China and experts and scholars from well-known universities in Thailand. They all have a deep understanding and professional interpretation ability in this field. The total number of participants in the sample group is 10, selected the participants from some universities, the sample group of this study will use probability sampling as a cluster sampling technique. Considering the

continuous development and changes in industries and professions, and more importantly, taking feedback from different countries and regions, it was decided to select participants from different professional fields and countries. Then they were divided into two groups, namely Chinese experts and Thai experts. These experts came from Mahasarakham University, Peking University, Beijing Film Academy, and Dalian Artists Association of China. The research fields of the experts are composed of animation art, new media art, and watercolor art.

2) Key informants' (Evaluative) group

There were 4 experts and scholars, including Peking University, Beijing Film Academy, Mahasarakham University, and Dalian Artists Association of China.

3.3.2 Instrument for data collection

Based on the research content, pre-design research questions and create interview outlines in advance, conduct a reasonable and effective evaluation of the proposed production methods, and provide direct opinions.

3.3.3 Method of data collection

To thoroughly explore the effectiveness of the new method that integrates watercolor artistic expression with digital animation production, this study employs in-depth interviews as the primary data collection tool. In-depth interviews are a qualitative research method aimed at obtaining a detailed understanding and personal insights from respondents on a particular topic through face-to-face, one-on-one interactions. This method allows researchers to gain a deeper understanding of the respondents' real experiences, technical needs, challenges, and perceptions when using the new method, thereby providing more targeted feedback for its improvement and application.

In this study, the interviewees include professional animators, artists, and educators in related fields. They were selected for the interviews due to their extensive experience in animation production and artistic expression, enabling them to provide valuable insights and suggestions. A semi-structured interview guide was used during the process, ensuring that core questions were addressed while giving respondents ample space to express their personal opinions and recommendations.

Specifically, the interview questions focused on the following key areas:

The Prospects of Watercolor Art in Digital Animation: Respondents were asked to share their views on the integration of traditional watercolor art with digital animation techniques and to discuss whether this approach could offer new creative possibilities.

Experience with Technology and Tools: The interviews delved into the technical challenges faced by respondents while using the method, such as the usability of software tools and the interactivity of the painting process.

Potential Applications in Teaching and Learning: Educators, in particular, shared their views on the potential of applying this new method in art education and discussed its impact on fostering student creativity.

Through these in-depth interviews, researchers were able to gather detailed feedback that could not be obtained through other research methods. The data collected not only helps researchers understand the practical effectiveness of the new method but also reveals potential areas for improvement across different user groups.

3.3.4 Method of data analysis

Through the results of interviews, researchers aim to gain a deeper understanding of the theoretical and practical foundations of the new method that integrates watercolor language with digital animation production, thereby providing support for future research and practical applications.

1) Theoretical Foundation and Conceptual Framework

Definition of Watercolor Language: Experts can clarify the concept of watercolor language, including its artistic characteristics, modes of expression, and potential applications in animation.

Current Status of Digital Animation: It is essential to understand the latest technologies, trends, and challenges faced in digital animation production, as well as how watercolor language can be incorporated into this field.

2)Methodology and Technical Application

Specific Processes of the New Method: Experts can offer insights into the specific processes of the new method, detailing the practical steps for integrating watercolor art with digital animation technologies.

Tools and Techniques: A discussion on the software, tools, and technologies used to realize this new method, such as digital drawing tablets and special effects software, is vital.

3)Practical Cases and Application Effects

Analysis of Successful Cases: Experts may share relevant successful cases that demonstrate the practical application effects of combining watercolor with digital animation.

Artistic and Commercial Value: An exploration of the artistic and commercial value of this new method in creative endeavors and commercial productions, including its applications in film, gaming, and advertising, is important.

4) Challenges and Improvements

Challenges Faced: A discussion on the primary challenges encountered during practice, such as technological limitations and fidelity in artistic expression, is necessary.

Suggestions for Improvement: Experts can provide suggestions for enhancing the new method, contributing to the refinement of the techniques and processes that integrate watercolor language with digital animation.

5) Education and Training

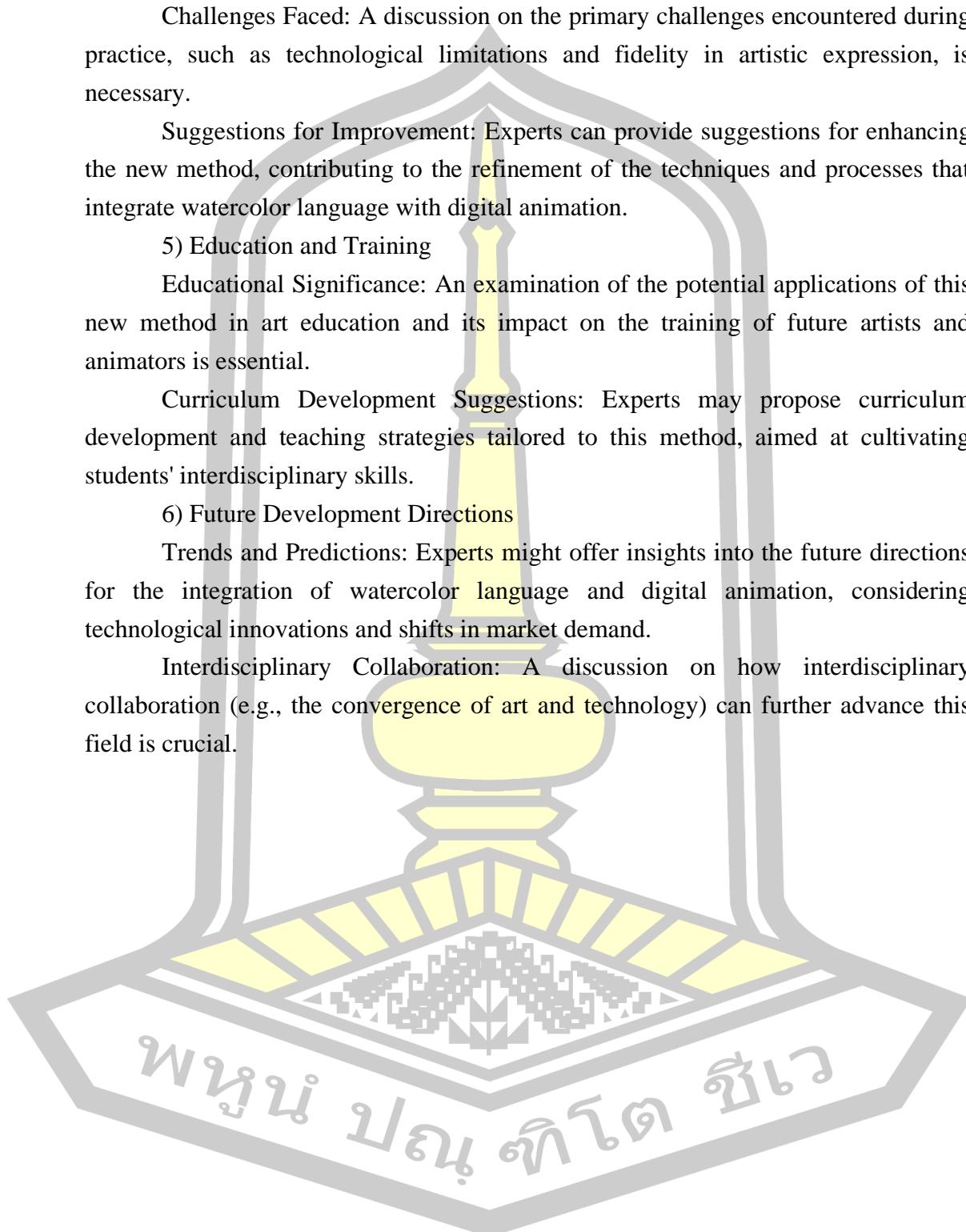
Educational Significance: An examination of the potential applications of this new method in art education and its impact on the training of future artists and animators is essential.

Curriculum Development Suggestions: Experts may propose curriculum development and teaching strategies tailored to this method, aimed at cultivating students' interdisciplinary skills.

6) Future Development Directions

Trends and Predictions: Experts might offer insights into the future directions for the integration of watercolor language and digital animation, considering technological innovations and shifts in market demand.

Interdisciplinary Collaboration: A discussion on how interdisciplinary collaboration (e.g., the convergence of art and technology) can further advance this field is crucial.



3.4 The test of watercolor animation effects

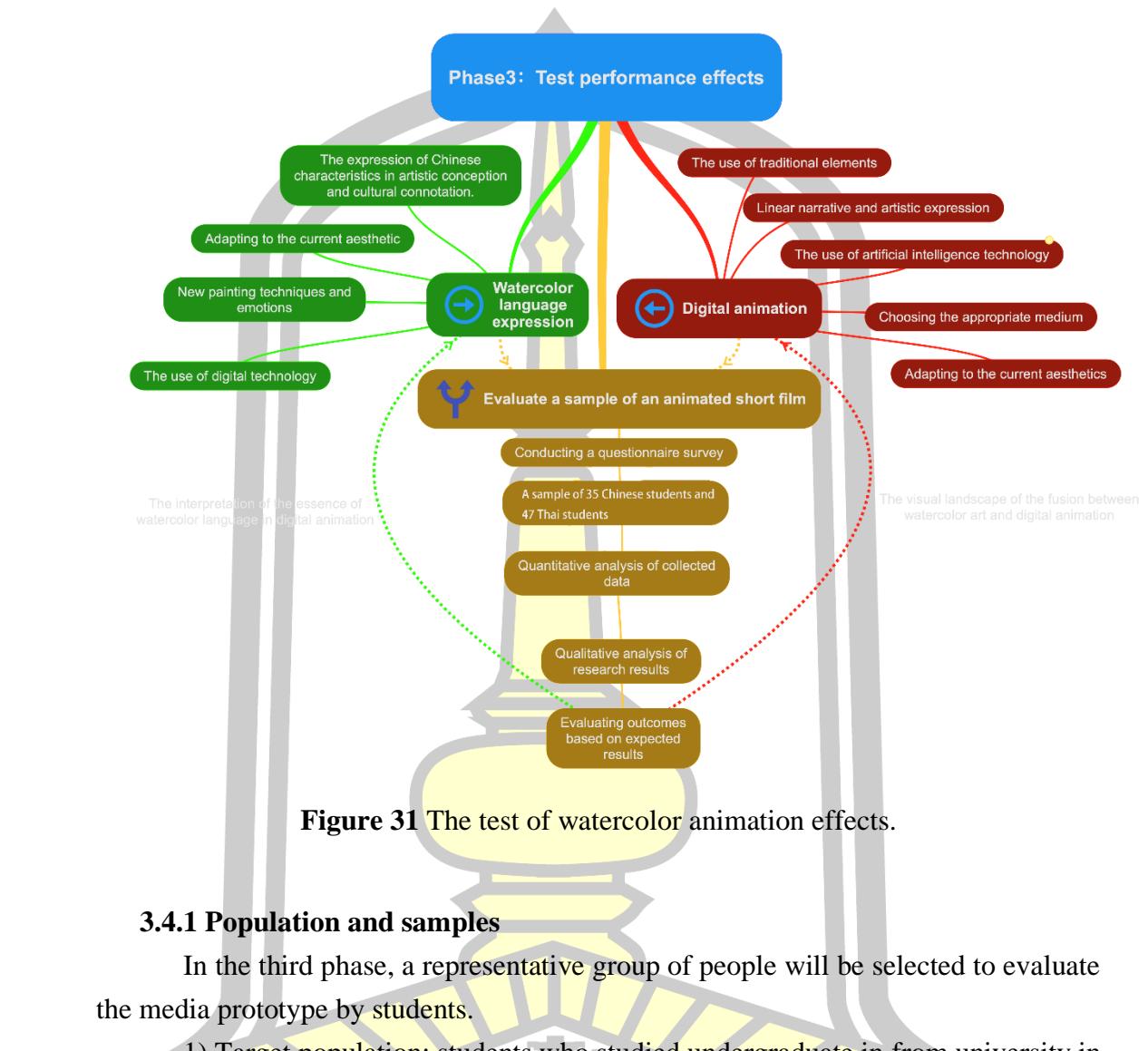


Figure 31 The test of watercolor animation effects.

3.4.1 Population and samples

In the third phase, a representative group of people will be selected to evaluate the media prototype by students.

1) Target population: students who studied undergraduate in from university in China and Thailand. These students enrolled for study in semester 1 academic year 2024. This research, there were 2 target population consisted of

1.1) Students majoring in animation, fine art, art design, and the other were selected from the Department of Film and Television Art at the Nanhui Film Academy, Haikou University of Economics, China, total amount was 187 students.

1.2) Students majoring in creative media was selected from the Department of New Media, Faculty of Informatics, Mahasarakham University, Thailand, total amount was 817 students.

2) Sample in this research was selected from the population, with the sample size given as a percentage between 15-20%. The sample population was randomly

selected from freshman to senior year. Among participants from some universities, probability sampling will be employed as a cluster sampling technique for the sample group in this study. Considering gender and varying levels of cultural exposure, participants will be selected from different age groups within the general population sample. Subsequently, they will be divided into two groups with an equal distribution of males and females. The number of samples as follow.

- 2.1) Chinese students: 35 undergraduate students from Haikou University of Economics.
- 2.2) Thai students: 47 undergraduate students from Mahasarakham University.

The sample group will be divided into 2 main groups with a total of 82 people. In this process, simple random sampling selection will be conducted using probability techniques as follows:

Key informants' (Evaluative) group

- (1) 35 undergraduate students from Haikou University of Economics.
- (2) 47 undergraduate students from Mahasarakham University.

Students' (Evaluative) group

The research subjects are undergraduate students and current university students from internationally influential universities. To ensure the objectivity of the test results, samples were selected from two different levels and depths of study. The total number of participants in the sample group is 82, 35 students from China, 47 students from Thailand.

3.4.2 Instrument for data collection

1. The sample of digital watercolor animation was a short animation film produced using the "Digital Watercolor Animation Model" proposed in the previous phase. The author formed a production team and took on key roles such as director, scriptwriter, and other important production tasks. AI technology was employed in certain production stages to enhance efficiency and explore the potential of various digital technologies. Throughout this process, the team assessed the current advantages AI brings to digital watercolor animation. The film's story was based on traditional Chinese themes but considering that the evaluation sample would not consist solely of Chinese students, the creative approach prioritized strong visuals over a complex narrative from the outset.

2. Surveys will be administered to a diverse audience, including 35 students' study in Haikou University of Economics, and 47 students' study in Mahasarakham University. The surveys will employ a 1–5-point rating scale, with an average score of

3. This assessment used a questionnaire to collect data. This questionnaire consisted of 4 parts as follows:

Part 1: The acceptance and preference for digital watercolor animation

Part 2: The effectiveness of watercolor animation in expressing emotions and narratives

Part 3: Audience's willingness to create and consume watercolor animation in the future

Part 4: Comparison of the differences in the acceptance of digital watercolor animation

3.4.3 Method of data collection

By employing methods such as investigation, experimentation, and observation, data is collected and subsequently classified, organized, and stored. The third phase aims to ensure the objectivity and effectiveness of the test results, with the research subjects for sample evaluation being university students with a background in animation studies.

3.4.4 Method of data analysis

Quantitative statistics were used to data analysis including:

Mean and standard deviation used to assess the central tendency and variability of participants' responses regarding their experiences with the watercolor language and digital animation techniques.

1. Mean and standard deviation were used to analyze the participants' ratings on scale regarding their satisfaction with the digital watercolor animation, with the mean indicating the average satisfaction level and the standard deviation reflecting the variability in responses.

2. An independent t-test was conducted to compare the usage and learning intention of Chinese and Thai students towards digital watercolor animation. This analysis aimed to determine if the new approach significantly improved students' understanding and engagement with the subject matter.

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Chapter 4

The Watercolor Language Expression in Animation Production Context

In this research project, the authors strive to find a new method more suitable for the expression of watercolor language in digital animation production within the current environment. In this chapter, methods for enhancing the expressive capability of watercolor language in digital animation production are identified through case analysis and literature review. The specific implementation steps are illustrated in the figure below:

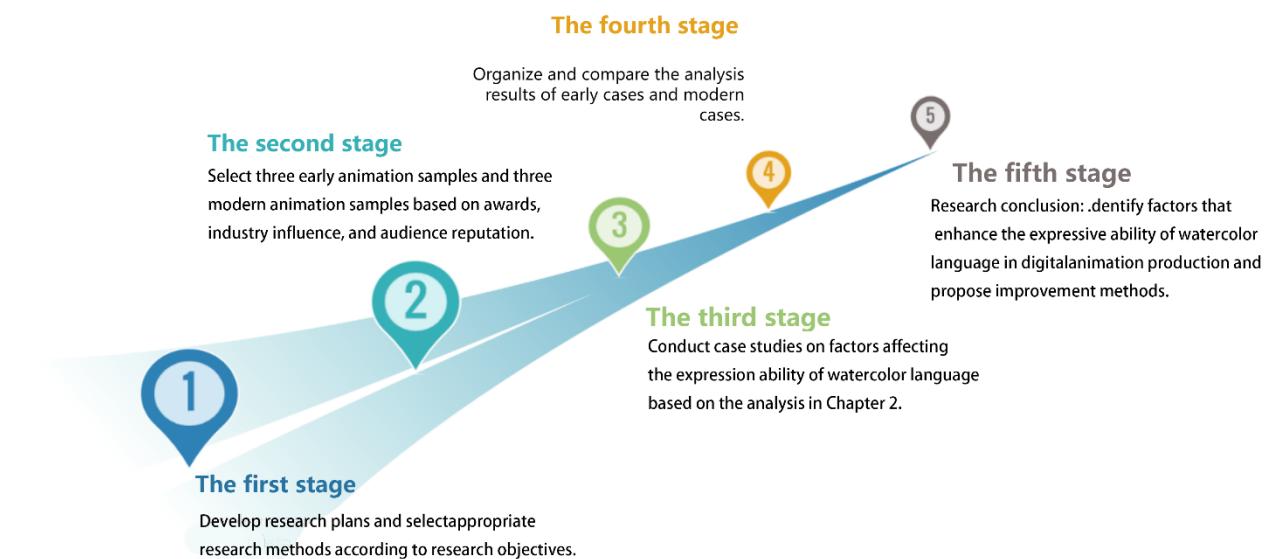


Figure 32 The steps for factors extraction

4.1 The case study of animated film with watercolor

Within this topic, the analysis samples will be determined through specific criteria-based selection. The selected animated film cases are divided into two parts. The first part consists of watercolor animation works produced before 2014, while the second part comprises works created between 2015 and 2024. Both parts will adhere to the same selection criteria, as follows:

Table 2 Animation sample selection

Case Study	Awards and Box office revenue	
	Awards	Box office revenue
The Nine-Colored Deer (1981, China)	<p>1.1985, The First Prize of the National Cultural Science and Technology Award for Chinese ink animation production techniques.</p> <p>2.1986, The Special Honor Prize at the International Animation Film Festival in Hamilton, Canada.</p>	
Monk and the Fish (1994, France)	<p>1.Nominated for Best Animated Short Film at the 67th Academy Awards.</p> <p>2.Nominated for Best Animated Short Film at the 48th British Academy Film Awards.</p>	
The Tale of Princess Kaguya (2013, Japan)	<p>1.The 68th Japan Movie Awards for Best Animated Film;</p> <p>2.The 23rd Japan Movie Critics Awards for Best Animated Film and Best Animated Director.</p> <p>3.The 2013 Visual Technology Award in the Animation Department by the Japan Motion Picture and Television Engineering Society.</p> <p>4.The Audience Choice Award at the 10th American Fantastic Film Festival.</p> <p>5.The Audience Choice Award at the 36th Milvaley Film Festival.</p> <p>6.Best Animated Film at the 35th Boston Film Critics Association Awards.</p> <p>7.Best Animated Film at the 40th Los Angeles Film Critics Association Awards.</p> <p>8.Best Animated Film at the 8th Asia Pacific Film Awards.</p> <p>9.The Animation Film Award at the 18th Toronto Film Critics Association Awards.</p> <p>10.Director's Award, Animator's Award, and Art Director's Award at the 2015</p>	\$24,366,656.00

Case Study	Awards and Box office revenue	
	Awards	Box office revenue
	<p>Tokyo Anime Awards.</p> <p>11. The Animation Film Award at the 12th International Film Phil Association Awards.</p> <p>12. Best Animated Feature at the 16th Lisbon International Animation Film Festival.</p> <p>And nominations for other major awards.</p>	
The Big Bad Fox and Other Tales (2017, France)	<p>1. Nominated for Best Director, Best Independent Animated Feature, and Best Character Animation at the 45th Annie Awards.</p> <p>2. Winner of Best Animated Film at the 23rd Lumière Awards in France.</p> <p>3. Winner of Best Animated Film at the 43rd César Awards in France.</p>	\$19,030,780.00
Wolf Walker (2020, Ireland)	<p>1. The 92nd National Board of Review Awards - Top Ten Independent Films of the Year.</p> <p>2. The 86th New York Film Critics Circle Awards - Best Animated Film.</p> <p>3. The 55th Kansas City Film Critics Circle Awards - Best Animated Feature.</p> <p>4. The 48th Annie Awards - Film Category: Best Independent Animated Feature, Best Director, Best Voice Acting, Best Production Design, Best Character Design.</p> <p>5. The 25th Satellite Awards - Best Animated/CG Film.</p> <p>6. The 25th San Diego Film Critics Society Awards - Best Animated Film.</p> <p>7. The 24th Toronto Film Critics Association Awards - Best Animated Feature.</p> <p>8. The 19th Utah Film Critics Association</p>	\$1,310,720.00

Case Study	Awards and Box office revenue	
	Awards	Box office revenue
	Awards - Best Animated Feature. 9. The 19th Columbus Film Critics Association Awards - Best Animated Film. 10. The 18th China Animation Golden Dragon Awards - Overseas Animation Award. 11. The 17th International Film Music Critics Association Awards - Film Category: Best Original Score for an Animated Film. 12. The 17th Alliance of Women Film Journalists Awards - Best Female Animated Character. 13. The 16th Austin Film Critics Association Awards - Best Animated Film. 14. The 5th Seattle Film Critics Society Awards - Best Animated Feature. 15. The 5th New Mexico Film Critics Association Awards - Best Animated Film. 16. The 4th Alliance of Women Film Journalists Awards - Best Animated Feature. 17. The 4th Hollywood Critics Association Film Awards - Best Animated Film. 18. The 1st Minnesota Film Critics Association Awards - Best Animated Film. 19. The 46th Los Angeles Film Critics Association Awards - Best Animated Film. 20. The 34th American Film Institute Festival Audience Choice Award - Best	

Case Study	Awards and Box office revenue	
	Awards	Box office revenue
	<p>Animated Film.</p> <p>21. The 33rd Chicago Film Critics Association Awards - Best Animated Film.</p> <p>22. The 15th Dublin Film Critics Circle Awards - Best Irish Film.</p> <p>23. The 9th Boston Online Film Critics Association Awards - Best Animated Film.</p> <p>24. The 3rd Online Film Critics Society Awards - Best Animated Film.</p> <p>As well as nominations from other prestigious awards.</p>	
Boy, Mole, Fox and Horse (2022, UK& USA)	<p>1. The 95th Academy Awards for Best Animated Short Film.</p> <p>2. The 76th British Academy Film Awards for Best Animated Short Film.</p>	

4.1.1 The animated short film "The Nine-Colored Deer" (1981, China)



Figure 33 Stills from *Nine-Colored Deer* (1)
Source: The Movie Database

"The Nine-Colored Deer" stands out in the history of Chinese animation for several reasons. Firstly, its production process was quite tumultuous, taking more than 20 years from inception to completion, often interrupted due to political factors. This imbued it with unique historical significance and value. Secondly, the film focuses on the Dunhuang murals, a national cultural heritage of China, conveying the beauty of Dunhuang to the world and making positive contributions to the dissemination and promotion of traditional Chinese culture. Additionally, the collaboration between the director, Qian Jiajun, and Dai Tielang, both seasoned talents in the field of Chinese animation, laid a solid foundation for the successful creation of "The Nine-Colored Deer." Finally, the film draws inspiration from Buddhist jataka tales, blending poetry and divinity, embodying the values of boundless truth, goodness, and beauty, and possessing a unique artistic charm. Therefore, considering these factors collectively, "The Nine-Colored Deer" has become a special and influential work in the history of Chinese animation.

1) Expression of the Story Theme

In summary, through these modifications, the animated film "Nine-Colored Deer" aims to convey themes of goodness, universal love, and the pursuit of truth, goodness, and beauty, and establish a common social values system. This adaptation has also received recognition and support from the studio leadership

2) Preliminary Art Design

For instance, in the "Desert Caravan" scene at the beginning of the story, the authors used earthy red and deep brown to render small mountain peaks in the western part of the frame, while tones such as earth yellow and stone blue were used for hills and slopes in the eastern part, implying the natural transition from the Flaming Mountains to the Qinling Mountains as the camera moves. Distant views were rendered with earth yellow, stone green, earth red, and mature brown to depict vast sand dunes, deserts, and layers of mountains, while the combination of light ink dots and lines highlighted the texture of the desert trade route, combining with the texture of the paper to immerse the audience quickly in the imaginative atmosphere of the Silk Road culture.

3) Expression of Watercolor Language

In summary, the application of this subjective color expression technique effectively promotes the theme of good versus evil and the pursuit of light and freedom in "Jiuse Lu", as well as the presentation of visual vividness and reality in animation films.

In animated films, the integration of static and dynamic scene elements is crucial for driving narrative and enhancing visual vividness. Dynamism, as an active

factor in presenting environmental clues and advancing the plot, creates vivid, real, and vivid visual experiences through the combination of static and dynamic visual effects, multi-layered image overlays, and perspective shifting techniques. The excellence of scene design in watercolor animation lies in its ability to utilize lively brushstrokes and versatile color rendering to create an endless visual feast with simple techniques. This is fully demonstrated in the snowstorm scene in "Jiuse Lu": designers use rough circular ink lines to depict tornadoes and, in the foreground, use rapidly moving lines and faint yellow and white lines to successfully capture and present the winds and rains before the snowstorm. When showing the Nine-Colored Deer roaming in the natural environment, designers cleverly divide the colorful flowers, trees, and grass into distant, middle, and near views. As the deer moves, the dynamic elements of the foreground and background landscapes interweave and gradually separate, bringing about delightful visual changes. As for the scene where the snake charmer ultimately drowns, the use of dynamic color blocks and lines in light blue on the water's surface, combined with the struggling figures, conveys the characters' inner fear and panic. This concise and vivid design of dynamic scene elements is a classic work in the field of watercolor animation.

The use of watercolor painting techniques to enhance the visual impact of scene design and to showcase national styles and spirits is a common pursuit among contemporary Chinese animation designers. The application of watercolor in animation scene production should not be limited to sensory-level intuitive responses but should delve into its rational aspects. The aim is to extract and create innovative works with rich traditional visual connotations from visual representations.

4) Music Accompaniment

The music for "Nine-Colored Deer" was co-composed by Cai Lu and Wu Yingju, who utilized avant-garde electronic music at the time. Compared to traditional music, electronic music carries a strange sense of fantasy, which, when combined with the imagery rich in traditional colors, creates a unique audiovisual experience. During the same period, other works from the Shanghai Animation Film Studio such as "Ginseng Fruit" and "The Golden Monkey Subdues Evil" also extensively used electronic music in their scores, demonstrating Meiying Studio's openness and innovation in creative concepts.

4.1.2 The animated short film "Monk and the Fish" (1994, France)

"The Monk and the Fish" is an experimental animated short film completed by British-Dutch artist Michael Dudok de Wit at the "Les Films de l'Arlequin" studio in France in 1994. Renowned for its simple and fresh artistic style, metaphorical thematic content, intricate detail portrayal, and perfect audio-visual effects, the film

has won numerous international awards, including the French Oscar for Best Animated Short Film, the 95th French César Award, and the European Golden Cartoon Award.

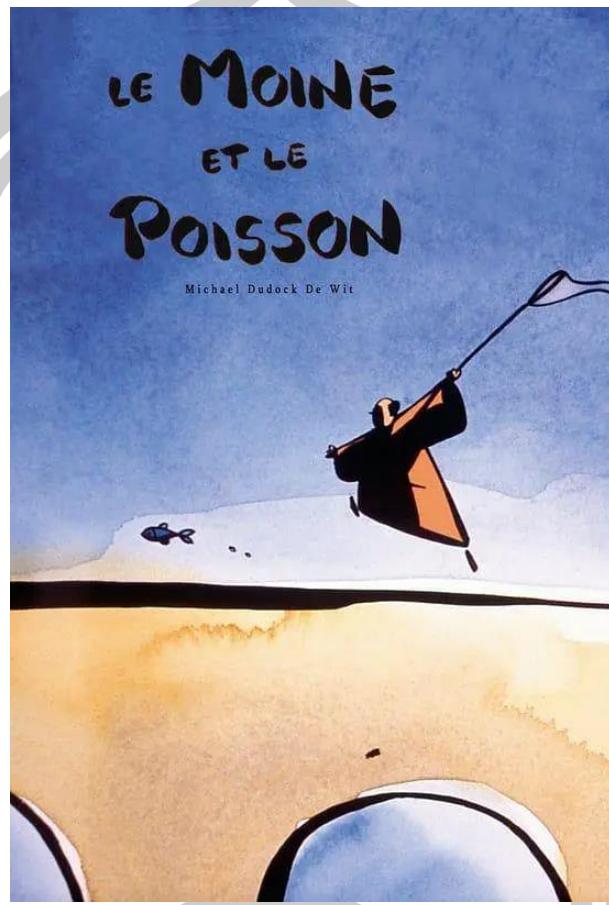


Figure 34 Stills from *Monk and the Fish* (1)
Source: The Movie Database

1) Expression of the Story Theme

Humans are highly social animals with thoughts and emotions. In real life, no one can resist the temptations of the material world. In this work, the fish represents desire, which may be secular material desire or spiritual freedom. The monks' strict rules and regulations torment them with worldly troubles, while they pursue a free life and ultimately abandon the material for spiritual enlightenment. In the final part of the film, after the fish swims out of the room and becomes calm, it starts swimming in the air. At this point, the little monk no longer catches fish but watches the fish quietly, gradually making way for the fish to enter a void world and soar together. The harmony between the little monk and the flying fish gradually fades away. From these scenes, it can be seen that catching fish is not for eating fish; these scenes represent the monk's spiritual liberation.

If one truly understands life, they can understand the philosophical meaning of the film. Monks, like ordinary people, also yearn for a free life. The monk's fishing is a kind of persistence, and persistence is also a kind of enlightenment. This paradox of prohibition and escape endows the film with a certain philosophical meaning.

2) Expression of Watercolor Language

Furthermore, in this animated short film, the techniques of Oriental ink painting are employed. Although European watercolor techniques are used, the film pursues a rich and varied artistic effect in line rendering, creating artworks imbued with Eastern aesthetic tastes. The film features a concise color scheme, predominantly monochromatic, with delicate handling of light and shadow to create a simple and lively atmosphere. Additionally, influenced by European comics and illustrations, the film often employs backlighting silhouettes, resulting in sharp black-and-white contrasts and a subtle, pure color palette. It's simple and fresh artistic style, vivid and expressive lines, and exquisite watercolor rendering achieve a perfect harmony between thematic ideas and external style. The entire film is hand-drawn, presenting an impressionistic style that provides Eastern audiences with a warm and peaceful artistic experience, standing out amidst the current trend of 3D animations with its distinctive personality. With its strong artistic appeal and emotional impact, it brings a breath of fresh air and romance to the audience.

3) Preliminary Art Design

In terms of styling, "Monk and Fish" inherits the unique style of French animation, emphasizing personalized styling design and highlighting the individual characteristics of animated characters. The film's humorous, exaggerated, and personality-filled style appeals to audiences of different ages and social backgrounds. The creation of the protagonist's image is distinct from the typical styles of American Disney and the delicate style of Japanese animation. In character shaping, the film employs a unique approach, avoiding close-up facial expressions of characters and instead capturing interactions between characters and the environment through wide-angle lenses, conveying the theme through body language. The exaggerated portrayal of character actions, through dynamic presentations such as the young monk attempting various methods to catch fish—using fishing rods, bare hands, nets, bows and arrows, etc.—creates a series of interconnected actions that progress layer by layer, demonstrating the young monk's steadfast pursuit of catching fish. Even during chanting, his thoughts never stray from catching fish. This persistence ultimately leads to the climax of the film: the nighttime scene where companions assist in catching fish, lighting candles to lure fish, etc., skillfully combining actions with the environment, sometimes calm and sometimes tense, engaging the audience.

emotionally at every turn. In the film's finale, as the fish leap over the terraces, fly out of the temple, and soar into the sky, the young monk and the fish begin to fly together, gradually disappearing into the sky, without any close-up shots of characters throughout the entire process. This method of conveying thematic ideas solely through actions has become Michael Dudok de Wit's signature creative style and is further demonstrated in his later Oscar-nominated film, "Father and Daughter".

4) Animation Production

Since the birth of animation, the dominant technique has been single-line flat painting. With the advancement of technology and the emergence of new materials and techniques, especially with the intervention of computer media, the scope of animation expression has been greatly expanded. However, regardless of how animation forms evolve, hand-drawn animation always exudes infinite artistic charm and embodies the essential characteristics of animation techniques. In animation creation, if the differences between consecutive frames are minimal, the animation's images will be more stable, and the playback will be smoother. Conversely, significant differences in visual elements such as position, shape, size, color, and brightness between consecutive frames may cause jitter or flickering during playback, which not only affects the smoothness of the animation but also may impact the audience's viewing experience. Therefore, there seems to be an irreconcilable contradiction between animation techniques and the uncertain characteristics of watercolor.

Hand-drawn animation requires frame-by-frame drawing and shooting, a process that is very time-consuming. Driven by the interests of the market economy, many animation production companies have abandoned this original hand-drawn technique and turned to computer multimedia technology to produce realistic animated blockbusters. While pursuing commercial profit is necessary, we should place more emphasis on the artistic value of animated films as a comprehensive art form. No matter how technology progresses, it can never replace culture and art. In the mass-produced technological products, people increasingly appreciate the uniqueness, originality, and inherent artistic value of handicrafts.

5) Music Accompaniment

The entire film does not use any dialogue and relies entirely on the harmony between the images and the music to tell the story. The combination of music and character actions is extremely close. As the actions change, the music presents different rises and falls and emotional transitions, like the natural flow of clouds and water, natural yet refreshing. The rhythm changes of the music correspond to the

characters' inner activities, expressing joy, loss, anger, or ultimate tranquility through the ups and downs of the music.

With the strong impact of commercial animations from countries such as the United States and Japan on the Chinese market, audiences are gradually attracted by these high-tech products. The appearance of "Monk and the Fish" brings a new and refreshing experience. Although this short film lacks the intense visual impact and high box office revenue of American and Japanese animations, its simple pictures, smooth lines, profound artistic conception, and incorporation of many Chinese elements make people feel close and make it a precious experimental animation masterpiece.

4.1.3 The animated film "The Tale of Princess Kaguya"(2013, Japan)

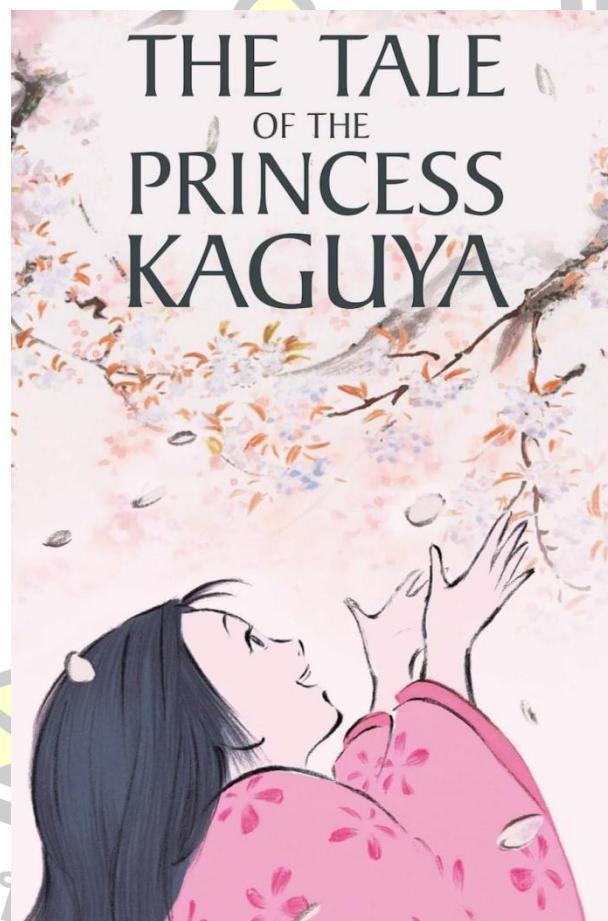


Figure 35 Stills from *The Tale of Princess Kaguya* (1)

Source: The Movie Database

The film "The Tale of Princess Kaguya" cost nearly 5 billion yen from preparation, planning to release, and even launched a legendary documentary about the 933-day production of "The Tale of Princess Kaguya" by Hayao Miyazaki. Throughout the entire film, Hayao Miyazaki skillfully combines elements such as

hand-drawing, landscapes, and colors to create a beautiful and refreshing animated films. Miyazaki is not only an outstanding animation director but also uniquely pursues the aesthetics of animated films. In the animation film market, he hopes to create works with personal characteristics that provoke audience contemplation. "The Tale of Princess Kaguya" is such a work, presenting a story full of effort over more than 100 minutes after years of polishing.

1) Expression of the Story Theme

From this perspective, Princess Kaguya's crimes and punishment can be understood as questioning the beauty and ugliness of worldly things, the goodness and evil of human hearts, which is also the issue that Mr. Hayao Miyazaki hopes the audience will ponder. Reflections on the meaning of being born human. When Princess Kaguya tells her foster father that she doesn't want to become the emperor's consort and uses death as a metaphor, she is extremely disappointed with the human world. Princess Kaguya unintentionally calls for help from the moon, fulfilling the wish of the celestial beings on the moon, and they come to take her back to the moon. However, unexpectedly, Princess Kaguya regrets it at the moment of leaving. This also reflects the reality where many people only realize the beauty and hardships of the human world at the last moment, but it is too late. Princess Kaguya is finally taken back to the moon. With a deep longing for the human world and missing her foster parents, she recalls the past of the human world on the lonely moon. The entire film is like a replica of the human world, where many people live in happiness but fail to cherish it, only seeing the shortcomings of social life, and at the moment of leaving, they are filled with regret and remorse. But it's too late; if they had thought carefully at that time, everything might have been different.

2) Expression of Watercolor Language

As for the depiction of the capital city, "The Tale of Princess Kaguya" creates a dreamlike atmosphere through the unique expression of ink wash painting, not characterized by grandeur but by etherealness, much like the protagonist Kaguya's experiences in the human world, resembling a dream. This artistic approach complements the Zen theme.

3) Preliminary Art Design

The way "The Tale of the Princess Kaguya" creates architectural scenery by referring to scroll paintings mainly manifests in scene design. Director Isao Takahata incorporated the style of scroll paintings into the animation, portraying ancient architectural scenery and creating a historical atmosphere. For example, when depicting the fields where Princess Kaguya lives, the film meticulously depicts natural elements such as flowers by the house, wild boars, and deer in the forest, while

borrowing the lines and colors of scroll paintings when depicting ships and palaces, making the architectural scenery more realistic and fuller of historical ambiance. Through this method, the animation presents a unique ancient atmosphere, making the audience feel as if they are in an ancient world.

4) Music Accompaniment

Although "The Tale of Princess Kaguya" was not commercially successful, with box office revenue even less than half of its production cost, it remains a masterpiece of high artistic value. The film's failure reflects the rapid pace of modern societal life and the fickleness of human nature; few are willing to take the time to appreciate such a deeply meaningful film. When profit and popularity become the mainstream pursuits of the film industry, works with high investment and low returns naturally receive little attention. However, Isao Takahata's non-commercial approach to filmmaking reflects his genuine pursuit of art.

4.1.4 The animated film "The Big Bad Fox and Other Tales" (2017, France)

In 2017, "The Big Bad Fox and Other Tales" received considerable acclaim in the French film industry. This film stood out for its unique creativity and carefully crafted "subtractive" technique, eschewing the strong impact of 3D visual effects. In terms of narrative structure, minimalist art style, symbolic representation, and thematic metaphors, it demonstrated exceptional craftsmanship and innovation.

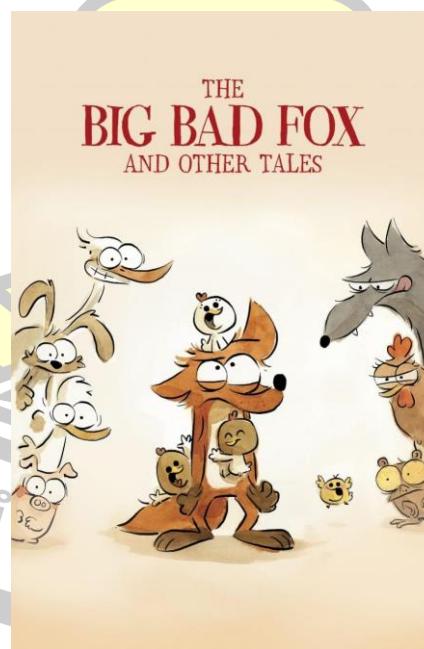


Figure 36 Stills from *The Big Bad Fox and Other Tales* (1)
Source: The Movie Database

1) Expression of the Story Theme

The film's authenticity in character portrayal is also reflected in the combination of animal traits with human behavior. Unlike the completely anthropomorphized animals in other stories, the animal characters here exhibit human behavioral patterns without strict good or evil divisions, making each animal's personality traits closer to its natural instincts and enhancing the realism of the characters.

2) Preliminary Art Design

The creative picture book style of "minimalism" is reflected in the characteristics of fewer details and more blank space in the visual details. This minimalist and refined style gives the audience greater space for imagination, stimulating their creativity and reading interests. Through concise lines and layouts, the picture book style creates a fresh and natural atmosphere, emphasizing the uniqueness of personal style, making the work more artistic. In animated films, this technique of leaving blank spaces contrasts sharply with CG-produced animations but deepens the film's implications, leaving a profound impression on viewers. Through the concise depiction of scenes and characters, viewers can better feel the emotions and subtleties of the work, thus creating a deeper resonance. The artistic implications of the "minimalism" of the picture book style not only manifest in visual effects but also integrate into the entire storyline, endowing the work with unique charm and artistic value.

The film adopts a static approach to scenes: clouds floating in the sky, flowing streams, swaying tree branches, and reeds, which are usually dynamic elements in other animated films but are deliberately fixed in the background in this movie. This deliberate choice is like creating a series of stage sets in the film, creating a unique picture book style.

3) Processing of Audiovisual Language

In summary, "The Big Bad Fox Story" brings audiences a joyful and amusing animated film through its simple plot, unique characters, and artistic style, evoking feelings of innocence and happiness. The differences between this animated film and mainstream animations are mainly manifested in artistic style and production techniques. Firstly, this animated film opts for a unique picture book style, using simple visuals and static scenes to create a fresh, unpretentious atmosphere, contrasting sharply with the mainstream animation's pursuit of realistic 3D effects. Secondly, this animation breaks through in terms of audio-visual language, creating a unique picture book sensation through fixed frames and unique presentation techniques, providing audiences with a distinctive artistic experience. Furthermore, unlike mainstream animations that focus on dazzling effects in promotion, this

animation emphasizes individuality and simplicity. European animation artists are keen to share their creative ideas and thoughts, showcasing a priority on personality over box office success, which is also a significant difference from mainstream animations. In conclusion, this animated film differs significantly from mainstream animations in terms of artistic style, audio-visual language, and promotion, presenting a unique style that is fresh, unpretentious, and full of innocence, becoming a refreshing stream in the animation industry.

4.1.5 The animated film "Wolf Walker" (2020, Ireland)



Figure 37 Stills from *Wolf Walker* (1)
Source: The Movie Database

"The Wolfwalkers" marks the conclusion of the Cartoon Saloon animation studio's Irish Folklore Trilogy, following "The Secret of Kells" (2009) and "Song of the Sea" (2014), under the leadership of Tomm Moore. Since its release, this film has garnered significant international acclaim, receiving 99 nominations out of 31 different international awards.

1) Expression of the Story Theme

The film's visual narrative, while carrying Irish traditional culture, also exhibits distinct ethnic aesthetic qualities. Through personalized modern artistic techniques, it breaks through temporal and spatial boundaries, allowing the audience

to deeply experience the artistic appeal of traditional ethnic culture while feeling emotionally moved. The symbols and traditional visual elements of ancient Celtic culture, laden with symbolism and metaphor, are contrasted through vivid visual effects such as dynamic and flowing lines, beautiful colors, and soft light and shadow, embellishing "the transition from distorted modern cities to spiritually rich natural worlds with simple characters and stories, drawing on the essence of folklore arts such as painting, literature, and music, praising the freedom of the soul and the capacity for love". This resonates with the audience in its subtle and sincere expression of ethnic emotions, forming a lasting traditional ethnic aesthetic style. "Wolfwalkers" adopts Celtic traditional symbols such as circles, single spirals, and double spirals in scene and prop design, and these symbols, as visual clues, drive the story forward. For example, the ethereal energy of the single spiral symbol is used in scenes and prop designs that align with the theme of growth. Whether it's the gentle contours of the wolfwalkers, intertwining vines, caves adorned with golden totems, or the colorful silhouettes of animals and the growth forms of dense forests delineated by animal scents, all life is symbolized and symbolized by trees and waterfalls decorated with spirals and straight lines, highlighting the magical vitality of nature.

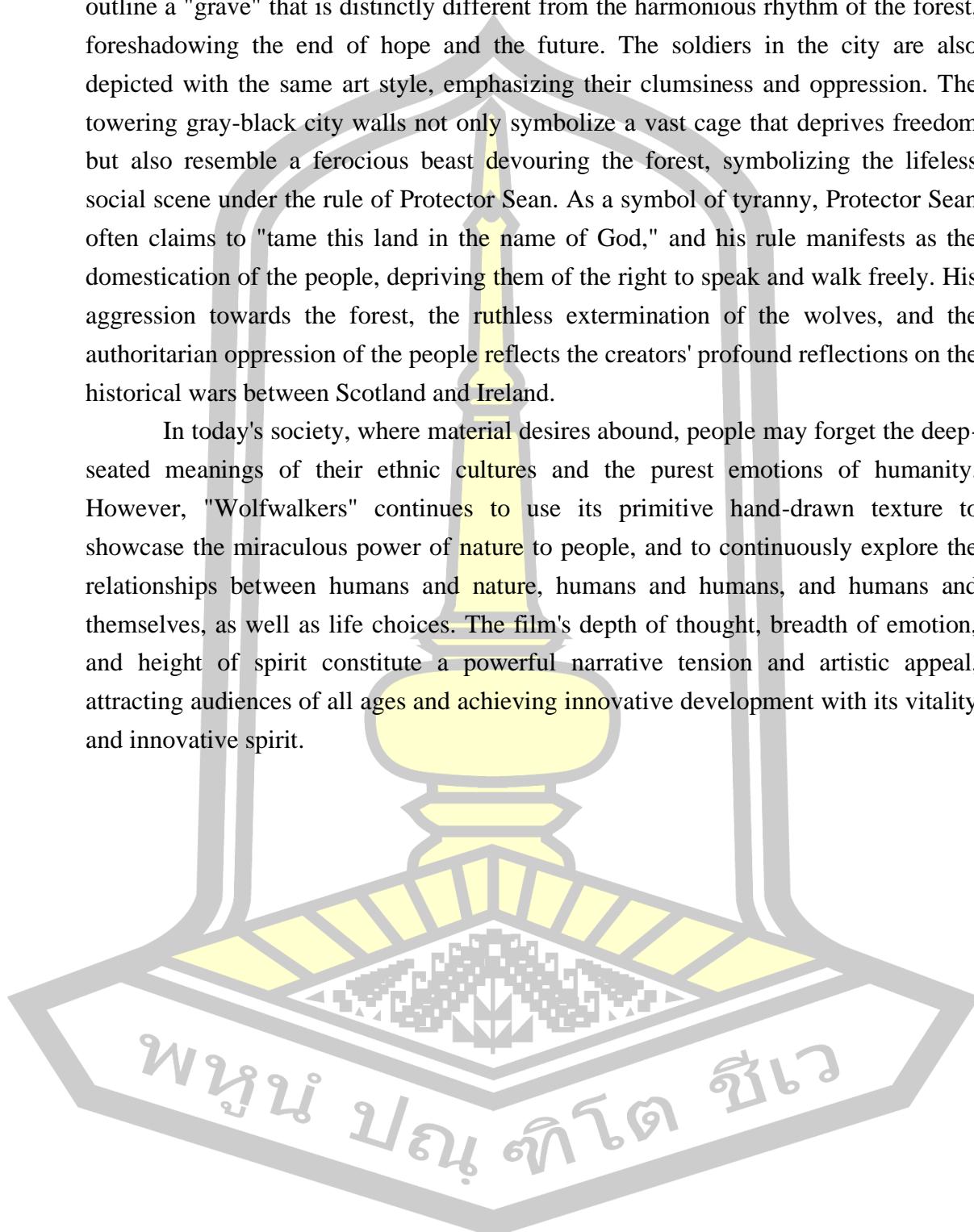
2) Preliminary Art Design

The transformation of individual perspectives before and after the Wolfwalker identity change provides an opportunity to address conflicts between humans and wolves and to reconcile the relationship between humans and nature. Viewers witness the awakening of character consciousness through perspective shifts. Robin's desire to become a hunter like her father stems not from hatred of the wolf pack or identification with her father, but from fear of the unknown and longing for a past happy life. Her rebellion and courage are suppressed by her father's "protection" in the name of love. Bill's hunting of the wolf pack is a desperate act under authoritarian oppression, making him the antithesis of nature. When golden energy is released from Bill's sleeping body in the form of a wolf, the stunning wolf's-eye view is displayed, and Bill begins to experience nature from a completely new perspective. After accepting the wolf's body, Bill quickly adapts and gains a new understanding of the Wolfwalker identity. Ultimately, he chooses to join the Wolfwalkers, overthrowing the Duke's rule, thus achieving self-liberation and redemption from long-standing oppression and ideological constraints.

The stylized lines and angular shapes of buildings and character designs not only create a unique visual experience but also carry symbolic and metaphorical meanings. In contrast, Kilkenny City, with its square-shaped appearance and tightly arranged triangular houses surrounded by towering walls, resembles a dead city in a

doomsday illusion at night. The city's rough black geometric lines and sharp angles outline a "grave" that is distinctly different from the harmonious rhythm of the forest, foreshadowing the end of hope and the future. The soldiers in the city are also depicted with the same art style, emphasizing their clumsiness and oppression. The towering gray-black city walls not only symbolize a vast cage that deprives freedom but also resemble a ferocious beast devouring the forest, symbolizing the lifeless social scene under the rule of Protector Sean. As a symbol of tyranny, Protector Sean often claims to "tame this land in the name of God," and his rule manifests as the domestication of the people, depriving them of the right to speak and walk freely. His aggression towards the forest, the ruthless extermination of the wolves, and the authoritarian oppression of the people reflects the creators' profound reflections on the historical wars between Scotland and Ireland.

In today's society, where material desires abound, people may forget the deep-seated meanings of their ethnic cultures and the purest emotions of humanity. However, "Wolfwalkers" continues to use its primitive hand-drawn texture to showcase the miraculous power of nature to people, and to continuously explore the relationships between humans and nature, humans and humans, and humans and themselves, as well as life choices. The film's depth of thought, breadth of emotion, and height of spirit constitute a powerful narrative tension and artistic appeal, attracting audiences of all ages and achieving innovative development with its vitality and innovative spirit.



4.1.6 The animated short film "Boy, Mole, Fox and Horse" (2022, UK& USA)

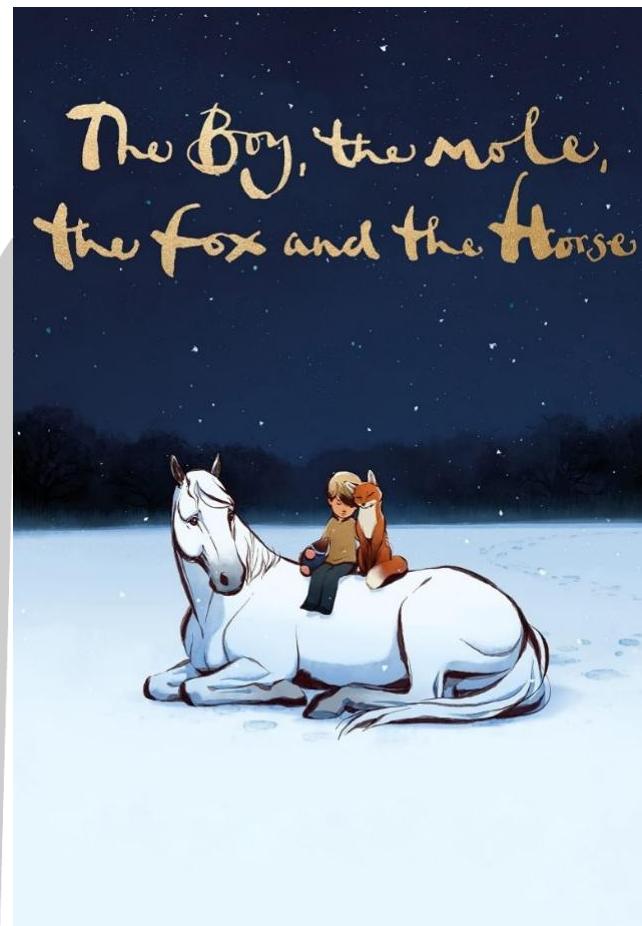


Figure 38 Stills from *Boy, Mole, Fox and Horse* (1)

Source: The Movie Database

At the 95th Academy Awards ceremony, the animated film "The Boy, the Mole, the Fox and the Horse" triumphed over its competitors, winning the accolade for Best Animated Short Film. Furthermore, the 50th Annual Annie Awards for Best Character Animation, Best Special Production, Best Directing, and Best Editing, as well as the 76th British Academy Film Awards for Best British Animated Short Film.

This short film, which lasts only 33 minutes, does not rely on complex plot designs or intense conflicts. Instead, it tells a story about love and growth through simple and clear lines and a gentle narrative rhythm. Against the backdrop of the post-pandemic era, the thematic ideas conveyed by this animated short film, which embodies the characteristics of a "healing journey film", resonate with the expectations of the public and mainstream social values. As a result, it has gained favor from a wide audience and Oscar judges.

1) Expression of the Story Theme

In "The Boy, the Mole, the Fox, and the Horse," character portrayal is achieved through metaphorical representation, emphasizing not only the design of external appearance and personality traits but also philosophical depth and implicit meanings. The boy represents everyone, completing the construction of one's true self through interactions with the mole, fox, and horse. The mole symbolizes vulnerability in childhood, while the fox and horse reflect mirrored aspects of life in different stages. The relationships between these characters are not simply categorized as "good" or "bad"; they demonstrate differences in personality, lifestyle habits, and through detailed depictions, interpret life, evoking emotional resonance in the audience. Symbolic techniques are employed in the film, such as the boy traversing through snow-covered wilderness, dialogues with the mole on tree branches, and the boy's reflection in the river, which, combined with the storyline, add warmth and healing to the film. Overall, "The Boy, the Mole, the Fox, and the Horse" presents rich connotations and emotions through metaphorical character portrayal, provoking deep thought and resonance among the audience.

2) Expression of Watercolor Language

The use of hand-drawn animation in the animated short film "The Boy, the Mole, the Fox, and the Horse" successfully blends with the film's heartwarming and healing themes and the artistic style of watercolor painting, creating a unique and captivating artistic charm. The hand-drawn animation provides a textured visual, different from the smoothness of computer-generated animation, presenting distinct brushstrokes and traces that make the film appear more real and vivid, bridging the gap between the audience and the film. In terms of emotional expression, hand-drawn animation, with its variations in line thickness, curvature, density, etc., delicately portrays the characters' emotional fluctuations, such as joy, anger, sorrow, and happiness. Moreover, the production process of hand-drawn animation is more flexible and allows for greater imagination and creativity, resulting in a unique artistic style.

3) Animation Production

In "The Boy, the Mole, the Fox, and the Horse," hand-drawn animation is fully utilized; all scenes, characters, and animals are hand-drawn, and watercolor rendering effects are applied, creating a fresh, dreamy, and artistically expressive imagery. The use of hand-drawn animation is not only a highlight of this animated short film but also greatly enhances the film's artistic appeal. Its unique beauty and texture resonate with the audience, while its subtle expression perfectly conveys the film's themes of friendship, love, and hope, creating an atmosphere of warmth and healing. Furthermore, the laborious process of hand-drawn production reflects the

creators' craftsmanship and sincerity, embodying the film's creative spirit. Therefore, hand-drawn animation in "The Boy, the Mole, the Fox, and the Horse" becomes an important part of the film's artistic expression, adding unique charm to the film and effectively conveying its heartwarming and healing themes.

By using a unique paper texture, successfully blending with the film's heartwarming and healing themes and the artistic style of watercolor painting, "The Boy, the Mole, the Fox, and the Horse" creates a unique artistic charm. This paper texture is particularly evident in the texture of the imagery, giving the visuals a sense of reality and naturalness and adding warmth and texture to the film. The film's color layers are rich and three-dimensional, resembling watercolor paintings, enhancing the visual depth and artistic characteristics of the imagery. Additionally, the light and shadow effects present a paper-like texture; the shadows of characters and scenes under sunlight show the texture of paper, providing a more realistic tactile experience for the film.

The use of paper texture is a major feature of this animated short film, not only enhancing its realism, making it easier for the audience to feel immersed but also deepening the film's warmth, complementing its heartwarming and healing themes, and enhancing its healing power. Furthermore, the use of paper texture enriches the film's artistic expression, making its artistic appeal even stronger. In conclusion, the paper texture in "The Boy, the Mole, the Fox, and the Horse" is an important part of the film's artistic expression, adding unique artistic charm to the film and better conveying its themes.

In general, these animation works not only demonstrate the advancement of technology, but also reflect the diversity and innovation of art, providing us with rich visual enjoyment and profound thinking. All cases show the effective integration of digital technology and traditional watercolor art, which not only retains their unique charm, but also creates a new visual language. Different works vary in the way of combination, some focus more on simulating watercolor effects, while others use watercolor elements as supplements or embellishments. Whether as the main visual style or an auxiliary means, the introduction of watercolor art has greatly enriched the emotional expression and aesthetic value of animation. These works demonstrate the possibility of cross-media collaboration and the rebirth of traditional art forms in the contemporary digital context.

The researcher has summarized the main points from the 6 case studies mentioned above as factors to be used in designing the model to be presented in this research as follows:

Table 3 The main points from case studies for factors analysis

Case study	Digital Technology Application	Watercolor elements	Combination method
The Nine-Colored Deer (1981, China)	Use digital technology to precisely control colors and lines to create delicate and layered images.	Simulates the rendering effect of watercolor paintings to add a soft, dreamy atmosphere to the scene.	Watercolor textures are superimposed on digital painting to give the picture a modern feel while retaining the charm of traditional art.
Monk and the Fish (1994, France)	Use advanced animation software for character design and scene construction to ensure smooth and natural movements.	Drawing on the transparency and fluidity of watercolor, it creates an airy, surreal feel.	The mysticism of the story was enhanced by incorporating watercolor effects into the digital animation through post-processing techniques.
The Tale of Princess Kaguya (2013, Japan)	High-definition digital rendering technology improves the detail expression of the picture.	Extensive use of watercolor-style backgrounds creates a classical and poetic visual experience.	Using watercolors as a source of inspiration, the unique color transitions and texture effects are reproduced through digital technology.
The Big Bad Fox and Other Tales (2017, France)	The simple and clear digital drawing style highlights the character's personality.	Some scenes are painted in watercolor style, adding a warm and childlike feel.	While maintaining the overall digital animation style, watercolor effects are used locally to create a sharp contrast.
Wolf Walker (2020, Ireland)	Detailed character modeling and motion capture technology show vivid expressions and	The use of watercolor-style depictions of the natural environment enhances the film's magical realism.	Based on digital animation, watercolor-style backgrounds and special effects are added to create a

Case study	Digital Technology Application	Watercolor elements	Combination method
	movements.		unique visual impact.
Boy, Mole, Fox and Horse (2022, UK& USA)	Digital processing is adopted in hand-painted style to retain the warmth and texture of hand-painted works.	Use a watercolor-like background rendering to add depth and emotional richness to the picture.	Simulate watercolor brushstrokes directly on the digital platform, achieving a seamless integration of traditional and modern techniques.

Overall, "The Nine-Colored Deer" uses digital technology to precisely control colors and lines to create delicate and layered images. The rendering effect of simulated watercolor paintings adds a soft and dreamy atmosphere to the scene. The watercolor texture is superimposed on the digital painting, making the picture both modern and traditional.

"The Monk and the Flying Fish" uses advanced animation software for character design and scene construction to ensure smooth and natural movements. Drawing on the transparency and fluidity of watercolor paintings, it creates a light and surreal feeling. The watercolor effect is incorporated into digital animation through post-processing technology to strengthen the mysticism of the story.

"The Boy, the Mole, the Fox and the Horse" is digitally processed in a hand-painted style, retaining the warmth and texture of hand-painted. Use a watercolor-like background rendering to increase the depth and emotional richness of the picture. Simulate watercolor brushstrokes directly on the digital platform to achieve seamless integration of traditional and modern technologies.

"The Tale of Princess Kaguya" uses high-definition digital rendering technology to enhance the detail expression of the picture. A large number of watercolor-style backgrounds are used to create a classical and poetic visual experience. Use watercolor paintings as a source of inspiration and reproduce their unique color transitions and texture effects through digital technology.

The concise and clear digital drawing style of "The Story of the Big Bad Fox" highlights the personality of the characters. Some scenes are in watercolor style, which adds a warm and childlike feeling. While maintaining the overall digital animation style, the watercolor effect is used locally to create a sharp contrast.

The detailed character modeling and motion capture technology of "Wolfwalkers" show vivid expressions and movements. The use of watercolor-style

natural environment depiction strengthens the magical realism style of the film. On the basis of digital animation, watercolor-style backgrounds and special effects are added to create a unique visual impact.

4.2 The results of analysis of watercolor language expression in animated films

The development of digital animation technology has had a profound impact on the evolution of watercolor art. Firstly, digital animation technology provides new forms of expression for watercolor art, expanding the possibilities of artistic creation. Through digital simulation and interactive communication, artists can create and showcase their work in virtual spaces, breaking through the limitations of traditional media and enhancing the aesthetic realm of art pieces. Secondly, digital animation technology facilitates the dissemination and promotion of watercolor art. The convenience and ease of dissemination of digital watercolor paintings enable artworks to be widely spread through platforms like the internet, attracting more participation and attention to watercolor art. In summary, digital animation technology injects new vitality and creativity into watercolor art, driving the diversification of artistic forms and bringing new artistic experiences and communication methods to both artists and audiences.

4.2.1 Artistic expression

The film "Nine-Colored Deer" adopts a traditional Chinese ink painting style, but may integrate digital technology in the production process, resulting in a blend of traditional ink charm and the smoothness of modern animation. In terms of artistic expression, it combines delicate watercolor backgrounds with dynamic digital animation to present a story full of mystery."Ink and Flying Fish" depicts subtle emotional exchanges between monks and flying fish through the soft colors of watercolor and precise motion capture of digital animation. The use of watercolor adds poetic and warm feelings to the visuals, while digital animation enhances the narrative flow of the story."The Tale of Princess Kaguya" is influenced by Japanese classical literature in its art style. The use of watercolor plays a key role in portraying natural landscapes and character emotions. The addition of digital animation brings a modern touch to the traditional story, enriching its artistic expression."The Big Bad Fox & Other Tales" uses watercolor to create dreamlike backgrounds and a cozy atmosphere, while digital animation gives characters vivid movements and expressions. This combination provides the story with the innocence of fairy tales while meeting the visual expectations of modern audiences."Wolfwalkers" blends traditional Irish cultural elements with modern animation technology. The use of watercolor is crucial in depicting natural landscapes and a mysterious atmosphere, while digital animation clarifies the complex storylines and character relationships.

Digital animation has influenced watercolor art in multiple ways. Firstly, it expands the spatial expression of watercolor art, making the creation more diverse. Secondly, it changes how people view art, constructing interactive and personalized platforms for artistic communication, thus increasing the popularity of watercolor art. Additionally, digital technology enables creators of watercolor art to explore possibilities more freely during the creative process, making their modes of creation more flexible. Digital animation also facilitates the promotion and dissemination of watercolor art; digital watercolor paintings can be showcased anytime through the internet. In conclusion, digital animation brings new development opportunities and challenges to watercolor art, prompting continuous innovation and breakthroughs in contemporary art.

4.2.2 Media transformation

"The Nine-Colored Deer" combines traditional Chinese ink painting style with modern digital animation technology. The use of watercolor is reflected in the rendering of colors and the portrayal of fluidity, while digital animation makes the visuals smoother, allowing for more complex dynamic effects. This combination not only enhances the visual aesthetic but also enables the work to be more widely disseminated through digital platforms. Similarly, "Monk and Fish" also employs the combination of watercolor and digital animation, creating a unique visual style. The soft texture of watercolor combined with the precise control of digital animation provides viewers with a visual experience that retains both traditional painting aesthetics and a sense of modernity. This combination also means that the work can be displayed and disseminated on different platforms through digital media. "The Tale of Princess Kaguya" combines traditional Japanese painting style with digital animation technology. The watercolor-style backgrounds complement the character designs in digital animation, creating a dreamlike visual effect. This combination not only preserves the essence of Japanese traditional culture but also allows the work to be disseminated globally through digitization. "The Big Bad Fox & Other Tales" relies more on digital animation technology, but in some scenes, the use of watercolor adds a sense of warmth and hand-drawn feeling. This combination provides viewers with a familiar yet modern viewing experience, while also facilitating the dissemination of the work through various digital platforms. "Wolfwalkers" is a combination of Irish mythology and modern animation technology. Although primarily using digital animation, the influence of watercolor can be seen in the handling of color and texture. This combination adds a mysterious atmosphere to the

work and enables it to be disseminated through digital means across different cultural backgrounds.

The advent of the digital age has led to a transformation in painting art media. The rise of new media art brings entirely new spaces and methods for expression to watercolor art. The development of digitalization and simulation diversifies watercolor painting creation, breaking traditional constraints. The interactive communication of digital animation technology changes people's attitudes toward art viewing and dissemination, providing a more interactive and personalized platform for the communication of watercolor art. The emergence of digital animation presents both opportunities and challenges; watercolor art, under digital animation technology, needs to explore new modes of creation freely. The impact of digital animation technology on watercolor art is a process of transformation and integration; the convenience and efficiency of digital painting make artistic creation more flexible, while digital technology also changes traditional aesthetic concepts and forms of expression. Under the development of digital technology, watercolor art needs to integrate with digital animation technology, continuously explore new creative possibilities, and achieve sustainable development in art.

4.2.3 Audience interaction

"The Nine-Colored Deer" adopts a traditional narrative approach, where the audience is a passive recipient, but the visual effects of watercolor can evoke emotional resonance. "Monk and the Fish" remains a linear narrative, but the watercolor style makes the story more vivid, enhancing audience immersion. Compared to traditional watercolor animation, the incorporation of digital technology in "The Tale of the Princess Kaguya" results in smoother visuals, providing viewers with a richer visual experience. "The Big Bad Fox and Other Tales" incorporates digital technology, allowing the audience to engage more deeply in the story and feel the characters' emotional changes. "The Boy, the Mole, the Fox, and the Horse" also benefits from the incorporation of digital technology, enabling the audience to engage more deeply in the story and feel the characters' emotional changes.

The development of digital animation technology brings new possibilities and challenges to watercolor art. Through digital simulation and virtual display, digital watercolor paintings break the physical limitations of traditional watercolor paintings, allowing artists to explore more freely in creative spaces. Digital watercolor paintings not only expand the forms of artistic expression but also enhance aesthetic experiences, allowing audiences to participate interactively and immerse themselves in multidimensional artistic worlds. Additionally, digital animation technology changes how art is viewed, providing artists with a more interactive and personalized

communication platform. Therefore, watercolor artists need to continuously improve their aesthetic abilities, expand their modes of creation, and pay attention to the integration of watercolor language with the times, to revitalize watercolor art, sustain its development in the context of digital animation, and attract more audiences. Digital watercolor painting, as a new form of painting, is essentially the product of digitally reproducing traditional watercolor painting forms, reflecting the fusion and innovation of tradition and modernity.

4.2.4 Technical integration

"The Deer of Nine Colors" predominantly embodies the artistic characteristics of traditional Chinese ink painting. Although not in the style of watercolor, modern technology can be employed in digital processing to simulate the flowing and rendering effects of ink wash, thus maintaining the visual charm of traditional Chinese painting while incorporating a sense of modernity. "Monk and the Fish" initially employs traditional watercolor techniques to depict characters and backgrounds, which are then further digitally processed after scanning into the computer. Through this method, animators can retain the natural gradients and transparent texture of watercolor while utilizing digital tools for color correction, compositing, and the addition of dynamic effects. "The Tale of the Princess Kaguya" is first painted with watercolor before being converted into digital format. Digital tools are used to enhance color richness, adjust details, and create complex animation sequences more conveniently. "The Boy, the Mole, the Fox and the Horse" is renowned for its simple and heartwarming hand-drawn style. The production method draws inspiration from the combination of watercolor and digital techniques, such as scanning hand-drawn sketches and using digital tools for coloring and embellishment, thereby preserving the artisanal feel and allowing for more flexible creativity.

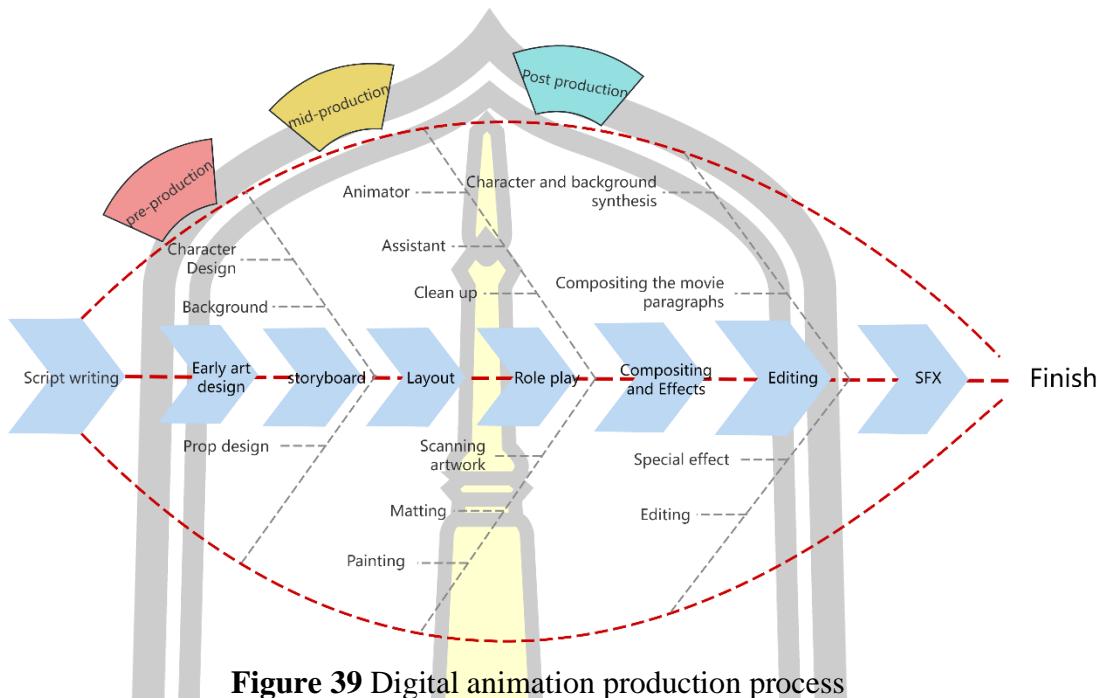
Digital animation technology has had a profound impact on watercolor art creation. Firstly, the flexible and free creative mode of digital painting makes artistic creation more convenient and efficient, while breaking the constraints of traditional watercolor painting, enabling arbitrary modifications and replication. Secondly, digital animation technology has changed the way people view art, constructing interactive and personalized art dissemination platforms, enhancing the interactivity and diversity of art dissemination. Finally, digital simulation and dissemination make watercolor art more modern and diverse, expanding the forms of expression of watercolor painting and enhancing its aesthetic connotations. Digital animation technology injects new vitality into watercolor art, promoting the integration and development of watercolor art with new media.

4.2.5 Stylistic innovation

"The Nine-Colored Deer" utilizes traditional ink painting techniques to depict characters and scenes, which are then digitally processed to create a flowing ink effect. This combination imbues the animation with the charm of Chinese traditional art while maintaining the smoothness and visual effects of modern animation. "Monk and Fish" employs watercolor-style rendering techniques combined with digital animation methods to convey a light and transparent texture. The soft colors and blurred edges of watercolor, combined with precise motion control in digital animation, create a unique visual experience. "The Big Bad Fox and Other Tales" features hand-drawn images with warm tones, evoking a sense of familiarity similar to watercolor paintings. The use of digital animation technology makes character movements more natural and fluid while preserving the warmth of hand-drawn art. "The Wolf Walkers" combines traditional hand-drawing techniques with modern digital animation production. Its unique visual style blends the soft colors of watercolor with the precise details of digital animation, creating a world full of mystery and magic. The combination of watercolor-style backgrounds with complex digital animation scenes provides audiences with an immersive viewing experience.

In the era of digital animation, watercolor art faces both opportunities and challenges. Artists need to break through the paradigm of traditional media, continuously improve their aesthetic abilities, and explore innovative paths that combine watercolor language with contemporary characteristics. Digital animation technology brings new forms of expression to watercolor art while also expanding its aesthetic connotations. The relationship between digital animation and watercolor art should be viewed dialectically, not as digital art replacing traditional painting, but as promoting the sustainable development of watercolor art through mutual connection and complementarity. The emergence of digital watercolor painting provides convenience for the promotion and dissemination of traditional watercolor art, while also prompting reflection on traditional art. To achieve the sustainable development of watercolor art, artists should actively integrate technological innovation, continuously explore new artistic expression methods, and bring forth new vitality and charm to watercolor art in the era of change.

4.2.6 Cultural value



"The Legacy and Innovation of Chinese Ancient Buddhist Painting Style in "Nine Colored Deer". The animation is adapted from the Dunhuang mural story "The Deer King's Past Life" and combines watercolor with digital animation, presenting rich elements of traditional Chinese culture. "Monk and Fish" conveys the concept of harmonious coexistence through watercolor animation. "The Tale of Princess Kaguya" showcases the charm of Japanese classical literature, its cultural value lies in the re-presentation of traditional stories in digital animation form, allowing the audience to experience the charm of classical culture combined with modern technology. These three works respectively demonstrate the characteristic cultural spirits of China, Ireland, and Japan. With the expressive style of watercolor language, they repackage the traditional cultures of various ethnic groups around the world in the form of new media. Although "The Big Bad Fox" is a modern work, its cultural value lies in exploring human nature and social issues through animal characters, demonstrating a modern perspective on traditional culture. "The Boy, the Mole, the Fox and the Horse" explores profound life philosophies and universal values such as friendship and exploration through its unique artistic style and profound themes. "The Big Bad Fox" and "The Boy, the Mole, the Fox and the Horse" praise the good qualities of human nature in a more affectionate way, providing cultural symbols that warm the hearts of both adults and children. "Wolf Walkers" combines Irish folklore

with modern animation technology, its cultural value lies in the modern interpretation of folk tales and profound reflections on the relationship between nature and humanity.

In the context of digital media, the production of animated films highlights the importance of technology, especially the introduction of digital technology, which brings breakthroughs and innovations to the production of animated films. Traditional hand-drawn animation showcases the individualized fine strokes of artists and stylized artistic boundaries, while digital animation brings innovation to the way images are produced, allowing the fusion of technological thinking and artistic understanding. The development of digital media technology not only promotes the competition and development of the animation film industry in various countries but also makes the artistic expression of global animated films more diverse and closer to the audience's needs. The construction and evolution of watercolor art media in the context of digital animation are not only technological innovations but also the inheritance and development of cultural values. Through this art form, positive values and moral principles can be conveyed, guiding audiences to contemplate important issues such as family relationships and moral concepts.

4.3 Conclusion

As shown in the figure 66, since the birth of animation art to the present day, the production process of animation has not undergone significant changes. However, with the development of digital technology and the advancement of hardware equipment, the production details in animations of different genres and styles exhibit distinct characteristics. Through the analysis of previous animated works, the summary of the impact of watercolor language technique expression on digital animation production methods is as follows:

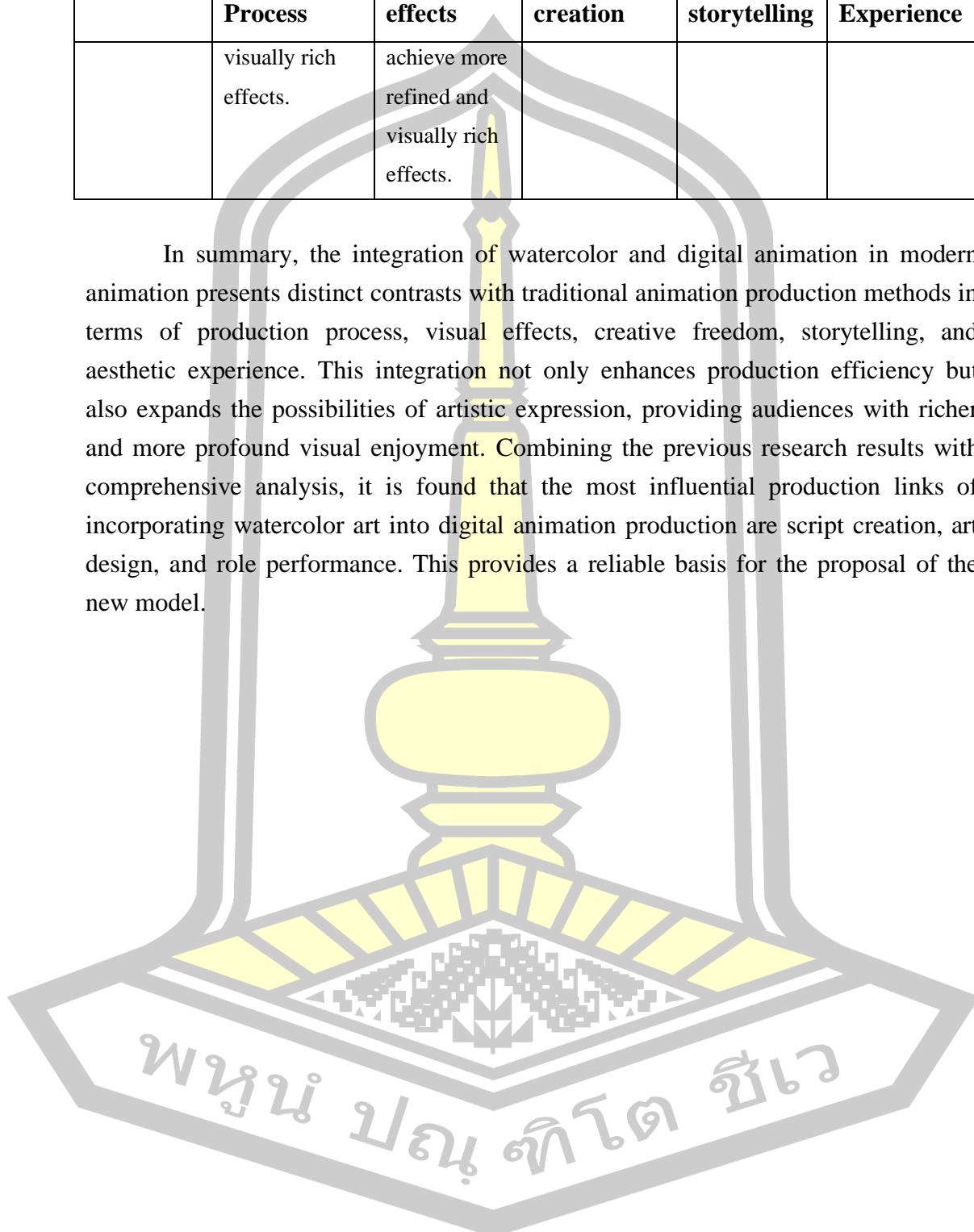
Table 4 Comparison between traditional and modern production methods

Methods	Production Process	Visual effects	Freedom of creation	Narrative storytelling	Aesthetic Experience
Traditional production methods	Dependent on manual drawing and frame-by-frame shooting, the production process is	Constrained by physical media and technology, the visual effects are relatively limited.	Due to the limitations imposed by actual shooting conditions, there are certain	It typically relies on a linear narrative storytelling approach.	Due to limitations in technology and expressive techniques, audience aesthetic

Methods	Production Process	Visual effects	Freedom of creation	Narrative storytelling	Aesthetic Experience
	tedious and time-consuming. Each frame requires animators to painstakingly complete, which limits the efficiency of the creative process.		constraints on the reproduction of dynamic effects and complex scenes.		experiences are relatively homogeneous.
Modern production methods	The use of digital technologies, such as Photoshop, Character Animator, and other software, has simplified the barriers to entry in animation production. The wet and dry techniques of watercolor can be combined with digital animation to achieve more refined and	The use of digital technologies, such as Photoshop, Character Animator, and other software, has simplified the barriers to entry in animation production. The wet and dry techniques of watercolor can be combined with digital animation to	The application of digital technology has broken these limitations, allowing creators to freely achieve more complex animation effects and storytelling.	Digital animation technology supports nonlinear editing, enabling more complex and diverse narrative styles.	The integration of new media and traditional watercolor art not only enriches the expressive capability of animation art but also provides audiences with a unique aesthetic experience.

Methods	Production Process	Visual effects	Freedom of creation	Narrative storytelling	Aesthetic Experience
	visually rich effects.	achieve more refined and visually rich effects.			

In summary, the integration of watercolor and digital animation in modern animation presents distinct contrasts with traditional animation production methods in terms of production process, visual effects, creative freedom, storytelling, and aesthetic experience. This integration not only enhances production efficiency but also expands the possibilities of artistic expression, providing audiences with richer and more profound visual enjoyment. Combining the previous research results with comprehensive analysis, it is found that the most influential production links of incorporating watercolor art into digital animation production are script creation, art design, and role performance. This provides a reliable basis for the proposal of the new model.



Chapter 5

Proposing the model “Digital Watercolor Animation”

Based on the summary and analysis presented earlier, enhancing the expressive capability of watercolor language in digital animation production in today's era requires redesign and reconsideration. To overcome developmental bottlenecks, it is necessary to meet the current development needs. This involves not only fully capturing the unique charm of watercolor art but also infusing new vitality into digital animation production. This chapter primarily proposes new methods for integrating watercolor art with animation production, drawing on in-depth interviews and the results summarized in the preceding sections.

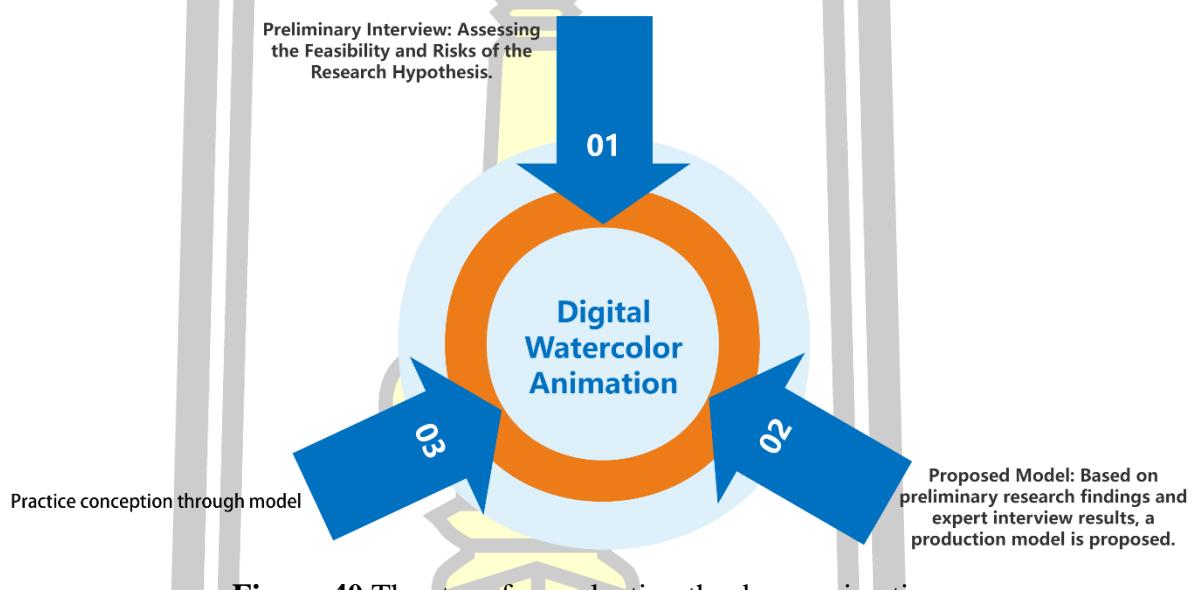


Figure 40 The steps for evaluation the demo animation

5.1 The result of factors analysis

The current phase involves preliminary interviews with the aim of designing targeted approaches based on expert opinions and analyzing the relationships and impact levels among influencing factors. Interviews with experts are conducted in a face-to-face format using pre-designed questions, and the interview content is recorded. After the interviews, the information is organized and analyzed. The results are primarily analyzed qualitatively, supplemented by quantitative analysis. To enhance the scientific validity of the test results, three Chinese experts and one Thai expert were selected.

5.1.1 Perspectives on the significance of integrating watercolor art with digital animation production

Experts have expressed diverse views on the significance of integrating watercolor art with digital animation production. Experts in the fields of watercolor and visual arts believe that:

Traditional watercolor art is widely appreciated for its unique aesthetic, especially in Japan and Western countries, where it is extensively used in static comics and animation creation. With the development of digital technology, the forms and dissemination channels of watercolor paintings have continuously evolved. Modern audiences access art through portable internet devices, enhancing the visibility and appreciation of watercolor art, thereby reflecting its value. Coupled with contemporary dissemination methods through social media and AI technology, watercolor art can be disseminated more efficiently, reinforcing its aesthetic appeal and unique charm. The application of digital technology in animation production has become increasingly prevalent, making the artistic effects of watercolor hand-painting more prominent. The advancement of digital printing and painting technologies has had a profound impact on watercolor art. While non-digital media artwork is limited in terms of dissemination channels, modern diversified media forms have infused new vitality into watercolor art. Watercolor art, deeply influenced by Impressionism, has, over more than a century of development—particularly in China—gradually incorporated Chinese ink techniques, showcasing a distinct expressiveness compared to Western styles. In contrast, Western watercolor art has lost some of its pure artistic value due to commercialization, with many artists engaging in commercial watercolor creation against their personal artistic inclinations for financial reasons. On the other hand, Chinese watercolor artists often focus on pure artistic expression. For young artists, pursuing pure art is a future choice. The development of watercolor art in China not only surpasses traditional Chinese painting but also demonstrates its commercial value through its application in digital animation. Therefore, keeping pace with market trends and integrating pure art with commercial activities is an important pathway for the development of watercolor art.

Experts in the fields of animation and new media assert that the objects observed in daily life are three-dimensional, and animation art reflects this by portraying three-dimensional spatial relationships and employing scripts that possess both literary qualities and artistic beauty. As an emerging art form, animation has benefited from the application of unique technologies, such as stop-motion photography and the audiovisual language of animation. The integration of digital technology marks a significant milestone in the history of animation. In early creative

practices, the absence of computer three-dimensional software technology rendered the live-action filming process complex and inefficient. Today, digital technology can simulate any content that a camera can capture, making it indispensable for nearly all animation works and live-action films. With the advancement of digital technology, the use of new technologies such as virtual reality, augmented reality, and hyperrealism has become increasingly prevalent. Traditional art presents three-dimensional content within a frame, while dynamic visual arts depict three-dimensional spatial imagery, catering to the audience's preference for three-dimensional space and representing future development trends. Artists need to respect the film's pursuit of space and art, accelerate the production efficiency of visual art works, and address obstacles in traditional artistic expression. The combination of traditional art and new media holds significant importance in the digital art field, not only in watercolor art but also in reflecting artists' understanding of the digital age, new cultural contexts, and artistic aesthetic languages. This integration brings new significance to traditional art, broadening its forms of expression. Digital animation can be viewed as a technology, tool, or medium, with its temporal and spatial tool attributes being particularly prominent. Watercolor art is inherently static, and it gains narrative functionality only through the integration of digital animation stories, thus embedding narrative aesthetics into watercolor art and combining elements such as montage and music. Watercolor language itself contains technical elements, and digital technology, inherently technical, enables more creative expressions through their combination. For Chinese animation, incorporating national elements holds particular importance. Integrating watercolor art into digital animation creation can challenge the technological language hegemony in modern art. Contemporary artists can use new forms of visual language expression, combining literary art, editing techniques, and digitally generated images to reinvent traditional art, reflecting the creators' profound cultural contemplation.

In summary, the integration of watercolor art with digital animation production bridges the gap between tradition and modernity, as well as between static and dynamic forms. Traditional watercolor art, cherished for its unique aesthetic and cultural background, has seen its dissemination and influence enhanced through the application of digital technology. This combination has also enriched its modes of expression. Experts in the field of visual arts believe that digital animation has breathed new life into watercolor art, allowing it to shine in modern media. Meanwhile, specialists in animation and new media emphasize that advancements in digital technology have made animation production more efficient and realistic, driving diversity and innovation in artistic expression. The fusion of these two fields

not only expands the application scope of watercolor art but also brings new possibilities in narrative aesthetics and creative expression. It provides artists with a broader creative space, particularly in incorporating ethnic elements into Chinese animation, further highlighting cultural value. This integration reflects a profound understanding and re-creation of culture and technology by artists, marking an important trend in the future development of art.

5.1.2 Factors of concern for experts on the integration of watercolor art and digital animation

Watercolor art and new media experts believe that the primary focus should be on showcasing the characteristics of watercolor, particularly the properties of water-based materials. In contrast to Chinese painting, which emphasizes the expression of ink tones, watercolor art integrates the features of both Eastern and Western art, such as the depiction of warm and cool tones, the contrast of solid and void, and the overall mood. Notably, while Chinese painting emphasizes the expression of artistic conception, watercolor art focuses on the treatment of mood. Moreover, whereas Chinese painting is limited to five fixed ink tones, watercolor art offers a richer palette of environmental colors, special scenes, and delicate representations of light and shadow. Thus, incorporating watercolor art into digital animation can enrich the content of digital animation and diversify its expressive techniques. Digital animation tends to prioritize technical aspects, so it is crucial not to overlook the inherent artistic qualities of watercolor art and to bring out its unique artistic charm. Key considerations include how to maintain the watercolor art style and how to convey the fluidity and extensibility intrinsic to watercolor. The subject matter should align with the artistic style and complement watercolor art.

Visual art experts emphasize two main points: first, the promotion of watercolor animation through traditional media, such as gallery exhibitions; and second, through modern social media. These two channels have significant differences. Combining traditional and modern forms inevitably leads to changes from traditional to contemporary formats. A key issue is whether there are sufficient platforms and channels to support this integration. It cannot be said that the combination of the two has fully matured, and whether better integration will occur in the future remains uncertain. Previous instances of incorporating various traditional art forms into different art-related fields of animation production have shown that merging many artistic elements can result in a more advanced production form than traditional methods, involving a broader range of artistic elements.

Animation experts believe that in practice, flat painting can indeed serve as a form of expression in film and television works, maintaining the uniqueness of artistic

style throughout the creative process, but it is difficult to truly achieve "cinematic" quality. This is because film is a temporal art form, while painting lacks both time and space. Space poses a particular challenge, as the focus of painting art lies more on pictorial and planar aspects, whereas artists often assert that spatialization is three-dimensional. Only through three-dimensionality can a sense of space be attained, and spatial perception constitutes one of the limiting factors preventing many traditional arts from becoming dynamic visual arts, such as Chinese painting, which cannot be adapted into commercial films due to its strong stylistic characteristics and inherent aesthetic limitations. The overly dominant style may result in visual fatigue among audiences when confronted with 90 minutes of continuous dynamic images, representing a lingering issue for many traditional arts that struggle to integrate their artistic charm into commercial films. For instance, in my own directed animated work "The Ginseng Kingdom," the artistic style transitions into spatial, three-dimensional form, suggesting that both aspects should complement each other. The artistic elements depicted in the work should possess spatial qualities, such as two-dimensional artistic effects, textures, and brushstrokes. This precisely illustrates the need for animation and painting to collaborate in order to truly animate traditional art forms. Returning to the issue at hand, the watermarks and textures of watercolor can maintain their two-dimensional aesthetic while also serving as the expressive intent of animation. Realistic representation in 3D animation (computer animation) is relatively straightforward but lacks aesthetic appeal. It can be said that it sacrifices one aspect while strengthening another. Therefore, these traditional painting arts and two-dimensional shadow puppetry are more adept at using two-dimensional animation to convey three-dimensional artistic beauty.

5.1.3 Advantages and challenges of combining watercolor art with digital animation

In summary, watercolor art possesses unique artistic charm in its distinctive water-based material representation and rich color handling, which, when combined with digital animation, can enrich the expressive techniques of animation. Nevertheless, animation experts point out that flat painting has limitations in spatial representation, thus unable to fully achieve a "cinematic" quality. Despite this, by portraying the delicate texture and mood of watercolor art through two-dimensional animation, it is possible to compensate for the lack of artistic expression in three-dimensional animation while preserving the aesthetic appeal of watercolor art. Further exploration and practical application are required in both platforms and channels to better integrate traditional art with modern digital technology in the future.

Advantages and Challenges of Combining Watercolor Art with Digital Animation, as per the views of four experts:

- 1) In the context of unique Chinese art forms, traditional cartoon works exhibit distinctive painting languages. Watercolor, as a form of painting, showcases its irreplaceable expressive power in artistic language. The manifestation of watercolor art not only holds unique value in the traditional sense but also, with the assistance of digital animation, can evolve into a three-dimensional art form. This evolution is akin to presenting a realistic scene through a virtual camera, as exemplified by the lifelike virtual world depicted in "Avatar."
- 2) The application of watercolor art in digital animation presents significant advantages. It not only enhances the practicality of watercolor art but also enriches the expressive capabilities of both mediums. Particularly noteworthy is its role in enhancing the efficiency of disseminating watercolor art, with the influential power of social media being indispensable. By transforming the traditional flat watercolor representation on paper into a three-dimensional visual effect, artistic creation becomes more diverse and vibrant, presented in various forms, thus providing viewers with multiple modes of appreciation. This transformation is sufficient to alter traditional modes of expression, attracting more audiences to engage in the appreciation of artistic works.

The challenges are summarized as follows:

- 1) Content generated by current artificial intelligence technology often lacks genuine emotion and subjective expression. In contrast, watercolor art, with its unique artistic charm and irreproducibility, showcases distinctive artistic qualities. The unique brushstrokes and techniques reminiscent of freehand Chinese painting style endow watercolor art with a singular artistic effect. These effects differ from many other art forms such as oil painting and Chinese painting, which can be replicated and imitated, while watercolor art remains challenging to replicate. Therefore, manifesting the unique charm of watercolor art in the creative process presents a challenging task.
- 2) This research aims to integrate watercolor art with digital animation. To achieve this goal, it is imperative to fully understand and appreciate the original artistic domains of both forms, recognizing their aesthetic sensibilities and values. Simultaneously, it is necessary to skillfully incorporate the independence and balance of different art forms into new modes of expression. The key lies in identifying the shortcomings of original watercolor artworks and making appropriate supplements in new forms of expression, thereby clearly understanding the changes made for the new mode of expression and articulating methods for altering others' watercolor works.

3) Although there are many 3D animations works in the market, their artistic styles and aesthetic levels still require enhancement. If it is possible to cinematicize artistic space while retaining artistic characteristics and effectively combining watercolor art with digital animation, a new artistic effect will emerge. However, the challenge lies in whether it is possible to fully represent the painting process, maintain the stability and dynamic artistic beauty of watercolor, convey the unique artistic meanings of watercolor art, and challenge traditional modes of expression.

In summary, in the unique art form of animated films in China, traditional cartoon works, through the unique painting form of watercolor, exhibit a distinctive artistic language and further development is supported by digital animation. This not only enhances the practicality and dissemination efficiency of watercolor art but also enriches its expressive power, providing viewers with more appreciation avenues. However, the challenge lies in the fact that current artificial intelligence technology lacks genuine emotion and expression in content generation, while watercolor art, with its unique brushstrokes and irreproducibility, presents artistic effects that are difficult to replicate. Therefore, integrating watercolor art with digital animation requires a profound understanding of the aesthetic sensibilities and values of both art forms and skillfully incorporating their independence and balance into new modes of expression, ultimately achieving a new artistic effect. Although there is still room for improvement in the artistic styles and aesthetic levels of 3D animation works, if the artistic features of watercolor art can be retained and combined with digital animation, a unique artistic effect will be produced, while facing the challenge of fully representing the painting process and conveying the unique artistic meanings of watercolor art.

5.1.4 The impact of the combination of watercolor art and digital animation on the traditional art field

New media experts regard the adoption of novel narrative methods as akin to a revolution—a dual revolution in both the medium of visual art and in technology. However, the current emulation of digital technology fails to fully capture the charm and spiritual essence of watercolor art.

Animation experts believe that true integration will inevitably lead to a breakthrough in digital animation, both in style and form.

From the perspective of visual art experts, integrating watercolor art into the process of digital animation creation can have either positive or negative effects, contingent upon the quality of the representation. With individuals increasingly exposed to various art forms, including traditional art, through social media, this research can enhance the attention given to traditional art. Particularly, when artists

repackage traditional art into new artistic presentations, scholars and artists engaged in or studying traditional art may express dissenting views, arguing that new forms of expression inadequately convey the aesthetic appeal of traditional art, thus undermining its representation.

Watercolor experts perceive this as a form of advancement for traditional art; watercolor art itself evolves, with contemporary artists employing increasingly simplified color schemes and integrating new technologies into various forms of traditional art. Various traditional art forms, including watercolor art, possess a temporal aspect to their talents. Hence, integrating traditional art with various new forms of media, enabling its animation, constitutes a meaningful endeavor.

In summary, digital technology holds revolutionary potential in merging with traditional watercolor art. This fusion may herald breakthroughs in digital animation, potentially spawning new styles and forms. Nonetheless, whether digital technology can successfully convey the charm and spiritual essence of watercolor art depends on the quality of its representation. Although some scholars and artists in traditional art fields may criticize new forms, arguing that they fail to adequately represent the beauty of traditional art, the exploration of integrating modern digital technology with traditional watercolor art not only increases the attention given to traditional art but also drives its innovation and development.

5.1.5 Balancing the characteristics of watercolor art and digital animation in the creative process

In the creative process of combining watercolor art with digital animation, how to balance their respective characteristics is deemed crucial by animation experts. They assert that the transformation from two-dimensional to three-dimensional is primarily reliant on technological advancements. By judiciously harnessing digital techniques, common methods of technical implementation include the cinematic adaptation of static paintings, encompassing applications in stage backgrounds, borderless imaging technologies, and even utilization across various media entities. The appearance of three-dimensional entities within digital animation imagery, in diverse forms, not only caters to the realm of digital animation artistry but also extends to the integration of virtual and real domains.

Visual art experts believe that in Thailand, the diversity of regional customs significantly influences the acceptance of artistic media. Varied customs among different regions necessitate clear delineation by artistic creators regarding what content is permissible to depict, thus avoiding taboo subjects. Artistic creation must emphasize the presentation of aesthetics and morality to ensure the transmission of ethical values. Aesthetic appeal encompasses not only external forms but also internal

sensations and the presentation of artistic values. Although there are differences in aesthetic levels between ordinary and professional audiences, judgments of beauty are universally applicable. Enhancing the visual appeal of works is crucial, and new artistic forms should employ targeted artistic elements to ensure that works retain their original artistic characteristics while becoming more refined, balanced, and independent, appealing to audiences at different levels.

When artists succeed in accentuating the sense of form, the expression transcends mere allure confined to digital filmic artistry. The perspective of new media experts emphasizes the necessity of tailoring creative practices according to distinct themes and the individual skill sets of creators. Insights from watercolor specialists and visual arts experts underscore the inherent independence and equilibrium of each artistic genre. Preserving their respective independence entails the generation of novel elements during the amalgamation process, not only focusing on technical prowess but also striving to maintain their artistic aesthetics and integrating secondary designs and the adoption of new techniques. The transformation process not only emphasizes technical proficiency but also aligns with the aesthetic preferences of the audience. Only by adhering to these principles can the equilibrium of independence be effectively manifested, thereby giving rise to a novel mode of expression, akin to a supplementation built upon the existing foundation.

In conclusion, the pivotal aspect of transitioning from two-dimensional to three-dimensional animation lies in the application of technology. By sensibly leveraging digital technology, static paintings can be transformed into cinematic presentations, encompassing applications in stage backgrounds, borderless imaging technologies, and the utilization across various media entities. This three-dimensionalization not only applies to the realm of digital animation artistry but also extends to the integration of virtual and real domains. When artists enhance the sense of form, the expression of their works transcends the mere allure of digital filmic artistry. Additionally, creative endeavors should be tailored to different themes and the unique skill sets of creators. Each artistic form possesses its inherent independence and equilibrium, necessitating the generation of novel elements during the amalgamation process, maintaining their aesthetic appeal, and integrating new techniques. This approach not only emphasizes technical proficiency but also aligns with the audience's aesthetic preferences, effectively showcasing the balance of independence and fostering the creation of new modes of expression, enriching the existing foundation.

5.1.6 Perspectives on overcoming public perception barriers

Watercolor art experts assert that emphasis should first be placed on selecting appropriate subjects. Watercolor art tends to be relatively concrete, so overly abstract content should be avoided. Additionally, animation possesses temporal characteristics, necessitating the portrayal of contemporary features such as tools used, presentation styles, and the use of artistic language. Lastly, watercolor language serves as a means of expression; therefore, consideration should be given to which aspects of watercolor language are suitable for conveying appropriate content, utilizing reasonable forms of expression to manifest artistic features.

Animation experts posit that watercolor, as a form of visual art and material, exhibits myriad variations. With current digital technology capable of faithfully simulating the texture of painting, the incorporation of digital animation techniques implies that creating animation in such styles no longer requires mastery of traditional watercolor techniques. This extension even broadens into the realm of animation creation, where artists no longer necessarily need to possess pure painting skills.

New media experts contend that the accumulation of cultural cognitive abilities and practical experience is essential for insight into life, as only through understanding life can meaningful expression be achieved. To produce popular art, a thorough understanding of popular aesthetics and a deep comprehension of contemporary cultural trends are prerequisites.

In summary, the accumulation of cultural cognitive abilities and practical experience plays a crucial role in artistic expression, with an understanding of popular aesthetics and contemporary culture being fundamental to creating popular art. Watercolor, as an artistic medium, exhibits versatility, but modern digital technology can simulate its effects, enabling creators to produce watercolor-style animation without complete mastery of traditional watercolor techniques. This trend extends further into animation creation, where artists are no longer obliged to possess purely painting skills. The significant influence of regional customs on the acceptance of artistic media necessitates that artistic creators avoid taboo subjects during creation, ensuring that works possess both aesthetic appeal and the transmission of ethical values. Despite differing aesthetic levels between ordinary and professional audiences, judgments of beauty hold international and global significance, thus emphasizing the importance of enhancing the visual appeal of works. When creating, attention should be paid to selecting subjects, avoiding overly abstract content, reflecting contemporary features, and effectively utilizing watercolor language and forms of expression to ensure that works possess artistic characteristics while being widely appreciated.

5.1.7 Sharing of creative experiences

Interviews with four experts revealed that due to variations in their research directions and fields, not every expert possessed direct creative experience relevant to this study. Nonetheless, each expert offered insightful suggestions based on their academic accumulations.

According to experts in new media, the main challenge lies in the insufficient skillset and understanding of creators, making it difficult to assemble teams with both solid painting and technical capabilities. Only through the effective integration of painting and technology can creative expectations be met.

Animation experts shared their creative insights, suggesting that the fusion of watercolor art and digital animation could draw inspiration from traditional Chinese ink animation, utilizing it as a reference for material and employing digital texturing techniques to depict artistic effects. They emphasized the incorporation of painting textures onto digital models. This fusion process allows for more diverse variations, addressing numerous complexities in animation performance, such as natural costume changes and color adjustments without the need for remodeling. Employing such techniques enhances the expressive forms of animated art.

Insights from watercolor art and visual art experts revealed that in Thailand, watercolor is rarely used independently for creation, primarily serving as a fundamental teaching tool and emotional expression medium, particularly for depicting natural landscapes. It is predominantly utilized for personal application and basic teaching in landscape painting. Additionally, experiments with acrylic painting have been attempted. While watercolor typically employs soft brushes and gradual color layering from light to dark, acrylic painting offers more flexibility, allowing for variations in brushstrokes from hard to soft and from dark to light, resulting in a more flexible expression. Hence, combining these two mediums offers greater freedom in color intensity and allocation, with the added ability to achieve different visual effects by substituting materials. Watercolor art inherently implies learning a distinct painting technique and skill set.

In summary, the integration of watercolor art and digital animation not only provides greater freedom in color intensity and allocation but also enables the attainment of diverse visual effects through material substitution. Watercolor art serves not only as a means of learning painting techniques but also as a tool for integration with digital animation, akin to traditional Chinese ink animation. By applying digital texturing techniques to incorporate painting textures onto digital models, complex issues in animation production can be resolved, thereby enhancing the expressive forms of animated art. Nevertheless, creators face challenges due to

insufficient skillsets and team capabilities, making it difficult to assemble teams proficient in both painting and technical aspects. Only through the effective integration of painting and technology can the desired creative outcomes be achieved.

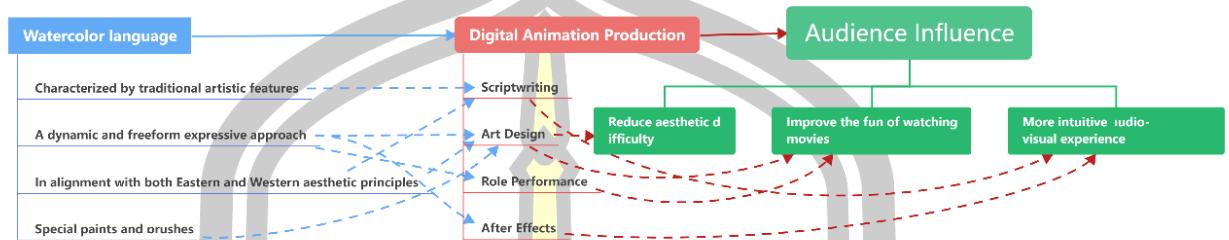


Figure 41 Summary of expert interview results

5.2 The model of “Digital Watercolor Animation”

Drawing on the research conclusions presented earlier, the relationships among the main variables of this study have been empirically validated, as illustrated in the figure below:

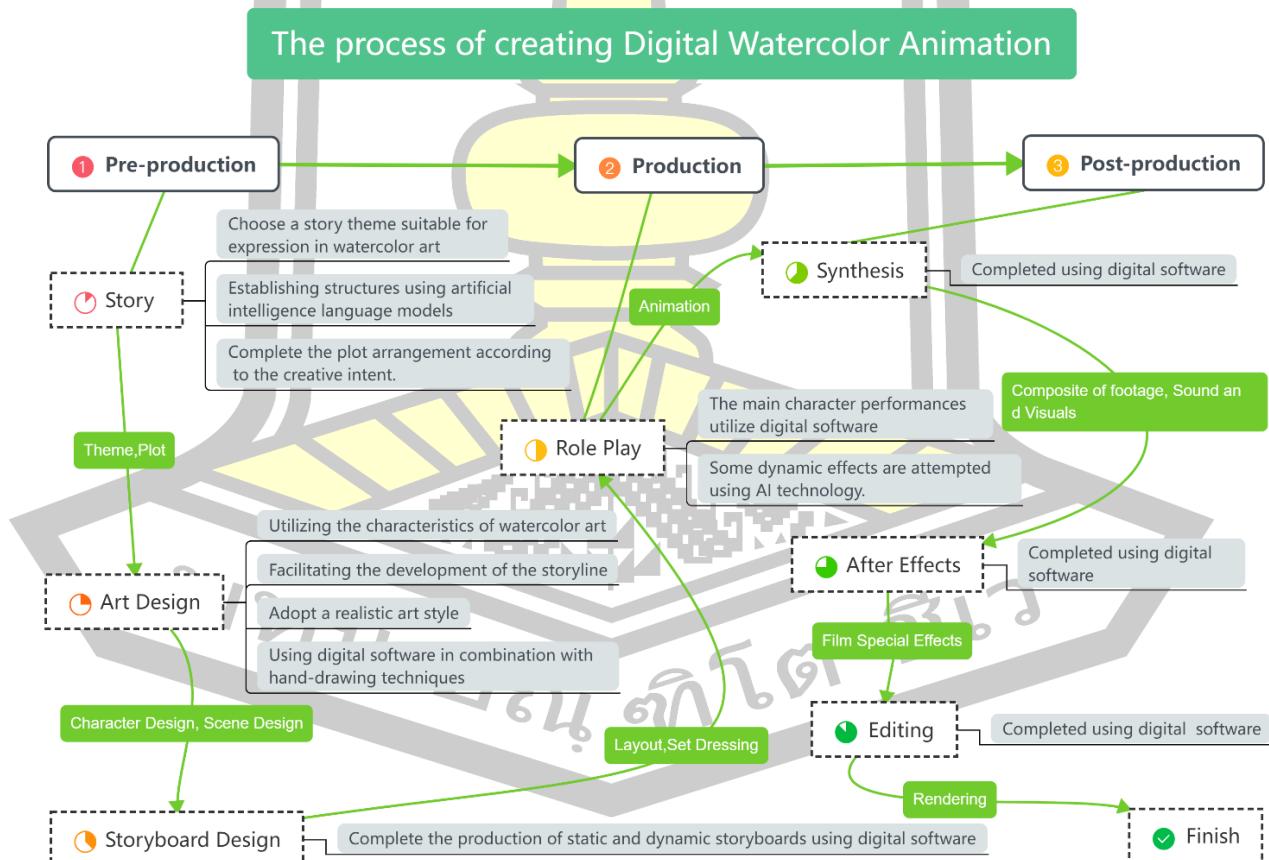


Figure 42 Proposing the new model

5.2.1 The proposal of model

This model is proposed based on the digital animation production process model. Based on following the animation production process and combining the opinions of interviewed experts, it appropriately incorporates the technical expression of watercolor language.

In the pre-production phase, the main changes are in the script writing and art design phases. In the story creation, more emphasis will be placed on themes that are easy to use the specialties of watercolor art, and some inspiration will be found with the help of artificial intelligence language models. In terms of art design, the characteristics of watercolor art, such as watercolor pigments, special brushstrokes of watercolor, and texture effects of watercolor, will be integrated into character design, scene design, and prop design.

In the mid-term production, some changes were made to the role performance. In addition to being different from the traditional two-dimensional hand-painted form, the use of digital software technology was added. More importantly, the aesthetic characteristics of watercolor art should be expressed while the role is being performed, without destroying the watercolor artistry shown in the art design process. Secondly, we tried to use AI technology to simulate some dynamic effects.

The post-production part follows the production process and technology of conventional digital animation and uses digital software to complete post-production work such as editing and synthesis.

5.2.2 The confirmation the model

It was determined through expert interviews that this model has sufficient practical significance. The combination of watercolor art and digital animation production has significant positive effects. This combination not only enriches the artistic expression of animation, but also brings a unique aesthetic experience to the audience. The following is an analysis of this combination:

1) Improve animation artistry: Watercolor techniques can give animation art settings a unique aesthetic and emotional conveying effect. Through the wet and dry techniques of watercolor, the uniqueness of animation creativity can be appropriately expressed, making animation works more realistic and closer to life.

2) Enhance emotional expression: The introduction of watercolor art makes animation works richer and deeper in emotional expression. The fluidity and transparency of watercolor can simulate dreamlike scenes, enhancing the emotional depth of the story and resonance with the audience.

3) Enrich visual hierarchy: The application of watercolor art adds more visual hierarchy and details to animated scenes. Through watercolor-style background

rendering, the animated world becomes more three-dimensional and colorful, providing the audience with a richer visual enjoyment.

4) Promote industrial development: The combination of watercolor and digital animation will help improve the overall quality of domestic animation, thereby promoting China's transformation from a "big animation country" to a "powerful animation country". This combination is of great significance for improving the international competitiveness of animation.

5) Cultivate innovation capabilities: The introduction of watercolor art encourages animation creators to explore new forms of expression and technical means and promotes innovation and development in the animation industry. At the same time, it also provides the possibility for the rebirth of traditional art forms in the contemporary digital context.

6) Provide educational opportunities: Activities such as outdoor watercolor sketching are important courses for animation staff to improve their self-cultivation. These activities not only hone the creators' art skills, but also provide them with valuable creative materials.

7) Expand market influence: The combination of watercolor art and digital animation helps to open new market areas. The unique artistic style and high-quality production level can attract more audiences and expand the market influence of animation works.

In summary, the "Digital Watercolor Animation" model is a fruitful artistic practice. It not only enhances the artistry and emotional expression of animation, but also brings new opportunities for the development of the animation industry. Through this combination, animation works can better touch people's hearts and convey profound cultural values and artistic charm.

5.3 Design scheme of the new method

Through in-depth interviews with four experts, it was understood that the combination of watercolor art and digital animation production bridges the gap between tradition and modernity, as well as between static and dynamic forms. Traditional watercolor art is beloved for its unique aesthetic appeal and cultural background. Through the application of digital technology, not only has its communicative power and influence been enhanced, but its expressive forms have also been enriched. Digital animation injects new vitality into watercolor art, allowing it to shine in modern communication media and promoting diversity and innovation in artistic expression. The integration of the two not only expands the application scope of watercolor art but also brings new possibilities in narrative aesthetics and creative

expression, especially by incorporating ethnic elements into Chinese animation, further highlighting cultural values. Although challenges persist in balancing technical performance and artistic expression, this integration reflects artists' profound understanding and re-creation of culture and technology, becoming a significant trend in the future development of art. By judiciously utilizing digital technology, watercolor art gains greater freedom in color density and blending, further enriching the expressive techniques of animation and providing artists with broader creative space.

Drawing on the research conclusions presented earlier, the relationships among the main variables of this study have been empirically validated, as illustrated in the figure below:

5.3.1 Art design

Digital watercolor animation is an art form that successfully combines the artistic charm of classic watercolor painting with the innovations of modern digital technology, offering a unique visual experience and mode of expression. In the art design process, the uniqueness and application of techniques in this type of animation are primarily reflected in the following key aspects:

1) Representation of watercolor texture:

Transparency and Layering: The transparency and layering of watercolor are its core characteristics. In digital watercolor animation, the texture of traditional watercolor is simulated by adjusting the transparency and overlay effects of layers.

Color Penetration and Diffusion: The color penetration and diffusion effects in traditional watercolor require precise control through digital tools (such as brushes and blending tools) to achieve natural color transitions.

2) Representation of brush strokes:

Diverse Brushes: By using different types of digital brushes (such as dry and wet brushes, and calligraphy brush effects), the diverse brush strokes of traditional watercolor are simulated, enriching the details and texture of the artwork.

Pressure Sensitivity: The pressure sensitivity function of graphic tablets can precisely control the thickness, transparency, and color variation of brush strokes, making the painting process closer to that of handmade watercolor paintings.

3) Character design:

Image Shaping: In character design, it is important to focus on soft and smooth lines, avoiding overly rigid lines to maintain the soft texture of watercolor.

Color Use: The color scheme for characters needs to consider the transparency and layering of watercolor, creating rich color layers and visual effects through gradients and color overlays.

4) Scene design:

Background Treatment: Scene backgrounds usually employ lighter colors and a blurred treatment method to make foreground characters and objects stand out while maintaining overall harmony in the artwork.

Detail Representation: Details in the scene, such as trees, buildings, and bodies of water, need to be represented through layered color overlays and variations in brush strokes to showcase the unique effects of watercolor.

5) Tools and techniques:

Drawing Software: Common drawing software like Adobe Photoshop, Corel Painter, and Procreate offers a variety of watercolor brushes and blending tools that can be used to simulate watercolor effects.

Graphic Tablets: Using high-precision graphic tablets like Wacom can enhance control and subtlety in the drawing process, especially in terms of brush strokes and pressure sensitivity.

5.3.2 Character performance

Digital watercolor animation is a form of animation that blends traditional watercolor art with digital technology. It not only retains the unique texture and color effects of watercolor paintings but also leverages digital technology to achieve smoother and more flexible animation effects. In the character performance segment, digital watercolor animation showcases its unique characteristics and technique applications:

1) Uniqueness:

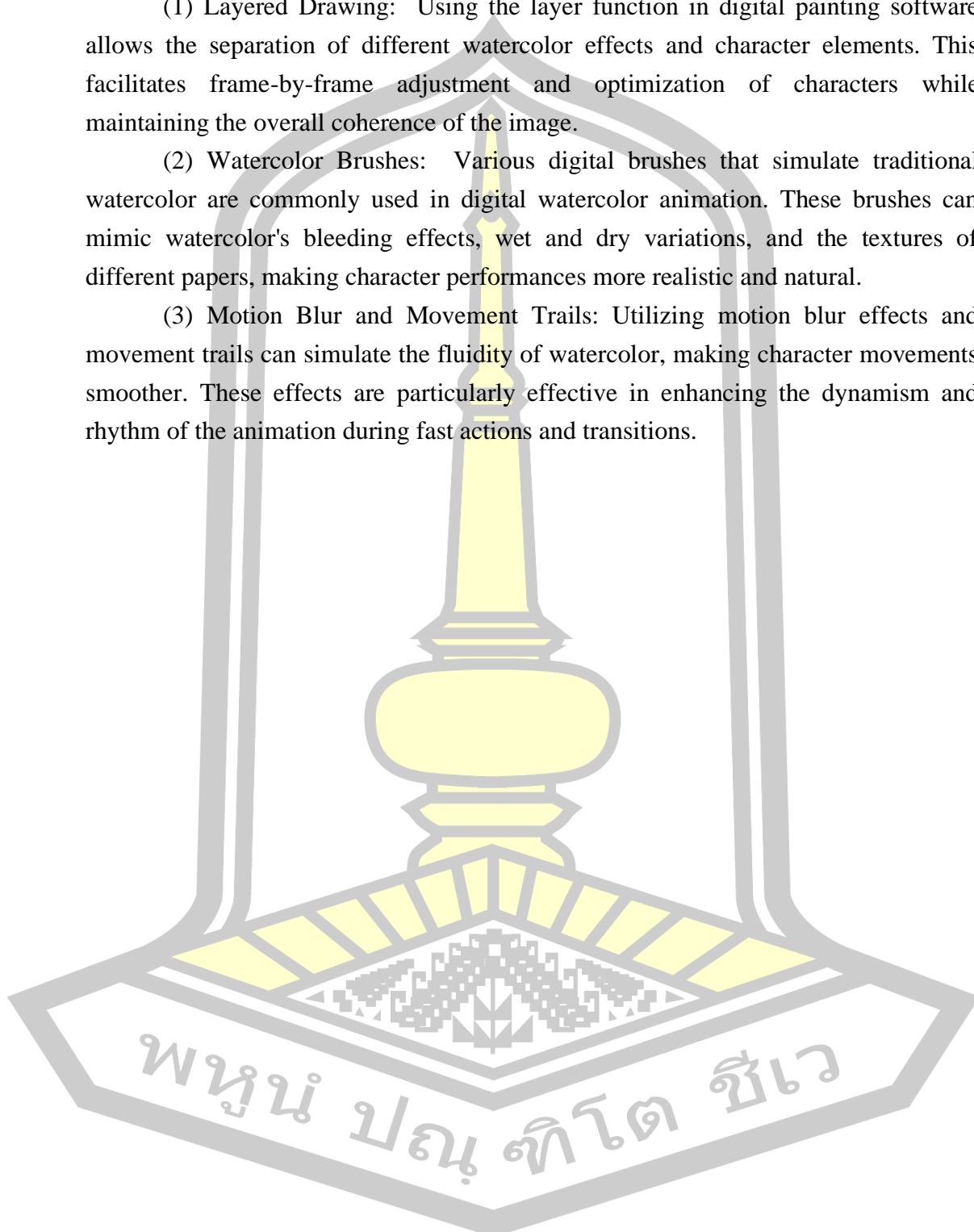
Firstly, the transparent quality and rich layering effects of watercolor make the transitions between colors appear more natural and fuller. When depicting characters, the subtle changes in color can profoundly illustrate the emotional fluctuations and inner world of the characters. Secondly, through digital processing, digital watercolor animation can capture the natural bleeding effects and irregular edge contours of traditional watercolor, creating a soft and dreamy visual experience. This unique texture makes the portrayal of characters more delicate, providing the audience with a one-of-a-kind visual experience. Lastly, digital watercolor animation can mimic the flow and diffusion characteristics of real watercolor. Such effects can greatly enhance the liveliness and dynamic beauty of the animation in the display of character movements.

2) Technique Applications:

(1) Layered Drawing: Using the layer function in digital painting software allows the separation of different watercolor effects and character elements. This facilitates frame-by-frame adjustment and optimization of characters while maintaining the overall coherence of the image.

(2) Watercolor Brushes: Various digital brushes that simulate traditional watercolor are commonly used in digital watercolor animation. These brushes can mimic watercolor's bleeding effects, wet and dry variations, and the textures of different papers, making character performances more realistic and natural.

(3) Motion Blur and Movement Trails: Utilizing motion blur effects and movement trails can simulate the fluidity of watercolor, making character movements smoother. These effects are particularly effective in enhancing the dynamism and rhythm of the animation during fast actions and transitions.



Chapter 6 Implementation of the Model

In the current chapter, the author extends the previous research by producing an animated short film using the "Digital Watercolor Animation" model proposed in the earlier stage. This production will be evaluated to assess the validity of the proposed method and identify areas for future improvement, ultimately leading to the research conclusions. In this chapter, the research results are presented in two parts: design and development of the animation based on the proposed model and evaluation of the acceptance of the animation by the sample group, as shown in Figure 70.



Figure 43 The chapter 6 research route

6.1 Implementation of the model to animation production

Based on the previously established models, the design was focused on three key production aspects: script creation, art design, and character performance. These are also the core components of "digital watercolor animation." To enhance production efficiency, AI technology was incorporated into certain stages of the production process, in addition to the digital animation workflow. The "Farewell My Concubine" was produced from the concept of proposed model, the detail as follow,

6.1.1 Scriptwriting

According to the digital watercolor animation model, the script in the pre-production stage should be created with content suitable for watercolor art expression, and artificial intelligence technology should be tried in the design process, and finally the storyline should be filled in according to the overall creativity. Considering the situation of the test population (Chinese students and Thai students), the author decided to use the processing technique of emphasizing the picture and weakening the plot to minimize the difficulty of some people in understanding the content of the story. Due to the artistic characteristics of watercolor, it can better play

a role in expressing traditional stories. Combined with the above factors, the specific production details are as follows:

In the early stages of sample development, the author first considered the unique strengths of watercolor in artistic expression, particularly its inherent advantages in depicting traditional stories. Therefore, we decided to focus on subjects with distinct characteristics and significant influence in traditional culture. Secondly, influenced by the target audience, the cultural expressions should have widespread appeal, and the cultural symbols presented should be representative. Finally, the scenes and character elements involved in the story should maximize the artistic charm of watercolor.

After a thorough discussion and analysis by the production team, it was decided to adapt the renowned Chinese historical event, the Battle of Gaixia, as recorded in the "Records of the Grand Historian: The Annals of Xiang Yu." The Battle of Gaixia primarily depicts how Han Xin, through strategic formation and command, ultimately defeated Xiang Yu, marking the end of the Chu-Han Contention. This pivotal battle occurred from December 203 BC to January 202 BC and was crucial in the struggle between the Chu and Han forces. Han Xin, as the commander of the Han army, demonstrated his exceptional military talent and strategic acumen. He utilized the terrain to his advantage, deploying the Han army in a five-army formation. Through ingenious tactical maneuvers, he successfully lured the enemy deeper and eventually defeated Xiang Yu's Chu army. This victory not only signified the conclusion of the Chu-Han Contention but also heralded the beginning of Liu Bang's ultimate triumph in establishing the Han Dynasty. This historical episode has been frequently depicted in traditional Chinese dramas and films, such as the movie "The Emperor's Shadow" (directed by Wei Handao, 2005) and "Farewell My Concubine" (directed by Chen Kaige, 1993). The story "Farewell My Concubine" has been adapted into various Chinese opera forms, including Peking Opera, Yu Opera, Dian Opera, Yiqiang Opera, and Tongzhou Bangzi Opera, showcasing its profound cultural significance and widespread influence in China. Additionally, this event gave rise to the Chinese idiom "Farewell My Concubine," which describes the tragic end of a hero and is now often used metaphorically to refer to those who act arbitrarily and become estranged from the masses, ultimately leading to their downfall. The narrative's straightforward and emotionally resonant content allows audiences to easily empathize and engage with the storyline. The main character, Xiang Yu, remains a beloved figure in numerous video games, such as the namesake character in the globally popular mobile game "Honor of Kings" and the Food Soul character in "Food Fantasy."

After deciding to adapt the "Battle of Gaixia," the production team assessed the workload and the time needed to clearly convey the theme, determining that the story would be approximately 3 minutes and 30 seconds long. They then selected the ChatGPT and Gemini language models for scriptwriting, using the following prompts: "Create a script for a digital animation short film with a watercolor art style based on the Chinese legend 'Farewell My Concubine,' with a duration of 3 minutes and 30 seconds" and "Create a script for a digital animation short film with a watercolor art style based on the historical Battle of Gaixia, with a duration of 3 minutes and 30 seconds." However, the generated results were not suitable as final scripts and had several issues. Firstly, they lacked creative plot expressions and tended to narrate events in a declarative tone, missing the "introduction, development, climax, and conclusion" structure typical of dramatic films. Secondly, they did not incorporate montage thinking, often using long takes with little to no sense of editing. Additionally, the models failed to simulate the director's creative focus, even with key prompts, as current language models still cannot fully emulate human screenwriters' work and thought processes. Finally, the models habitually included excessive narration or dialogue, which completely deviated from the intended creative vision.

It is evident that the creation of an animation script, like other forms of literary creation, is an activity rooted in human thought and culture, encompassing neurological, psychological, linguistic, cognitive, and cultural levels. Although artificial intelligence continues to advance, it still falls short of human intelligence in terms of language, thought, and culture. For instance, Microsoft XiaoIce can imitate human literary styles to compose poetry through deep learning and the emulation of a vast number of poems, rather than through human insight or inspiration. Literary creation requires humanistic thinking to interpret human nature, emotions, and worldviews. Machines, lacking human emotions, cannot understand audience needs and can only rationally deduce and describe. For example, in "One Piece," the dramatic duel between Luffy and Usopp is something artificial intelligence cannot create because it cannot perceive and describe human sensibility and emotions. Furthermore, due to the lack of shared experience between machine creators and human audiences, artificial intelligence cannot understand or express the eternal themes in literature—life and love—thus failing to produce genuine human-centric scripts and literary works.

The final decision was to incorporate only selected parts of the AI-generated content into the script, with the main storyline and framework still being crafted by the creative team. The sample is titled "Despair," inspired by the "Song of Gaixia" from the "Records of the Grand Historian" (Shiji). The author of this song is none

other than Xiang Yu himself, and one line reads, "My steed refuses to go on; what can I do?" This

line will also be depicted in the film, not only to emphasize the theme but also to enhance the tragic end of the "Hegemon-King of Western Chu."



Figure 44 Opening Still from the Animated Sample (homemade)

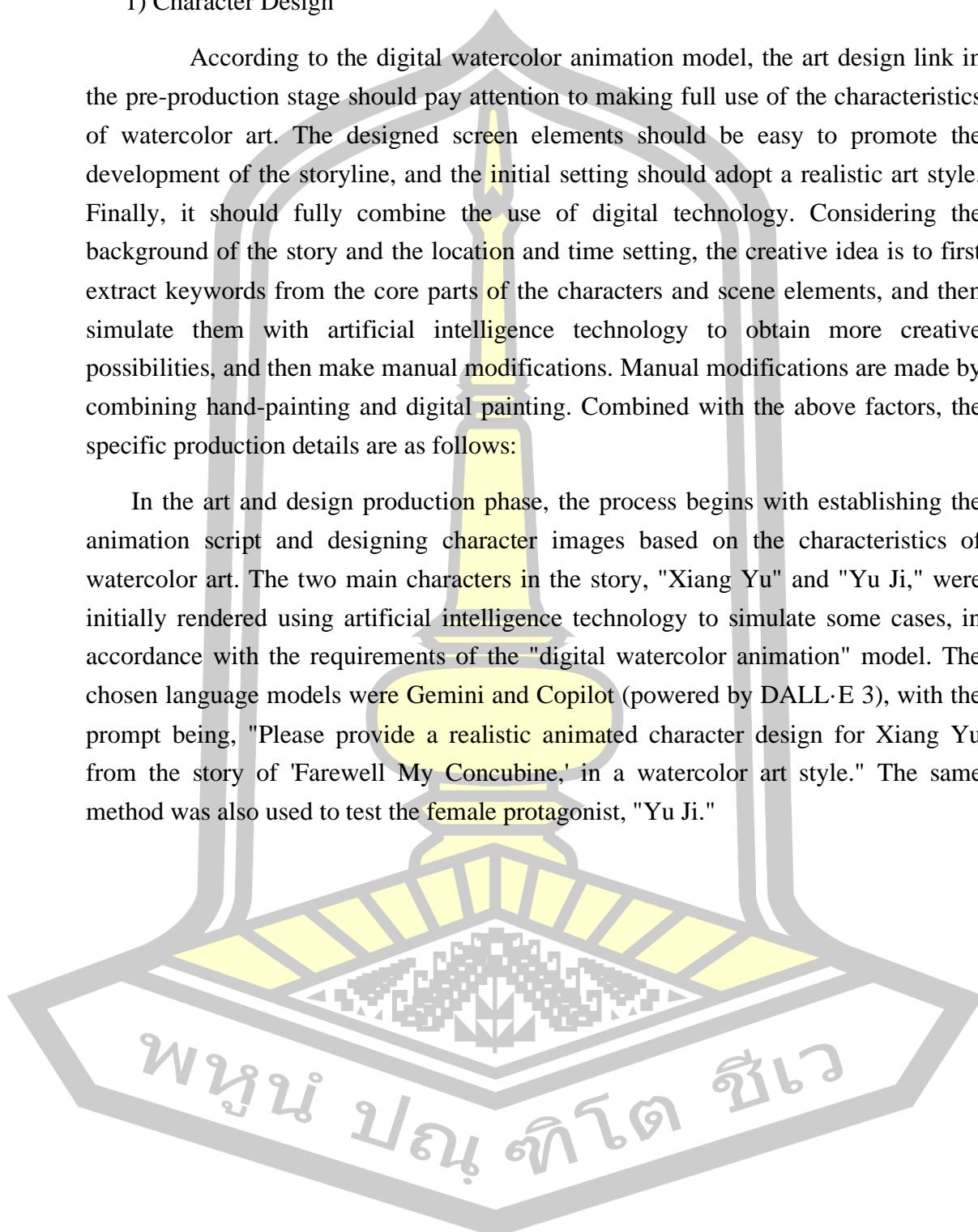
The story focuses on the defeat of Xiang Yu at Gaixia, using the rhythm changes of Lady Yu playing the qin and her dance movements to subtly hint at Xiang Yu's situation, thereby engaging the audience's emotions through indirect characterization. The film consists of four scenes—'Appearance,' 'Battle,' 'Dance,' and 'Defeat'—comprising a total of 38 shots. Although the male and female protagonists do not have direct contact, the audience can clearly feel their relationship and emotional connection. The film repeatedly uses the motif of the 'jade pendant' to signify the connection between the characters, ultimately leading to an open-ended conclusion that hints at their fate without directly depicting Xiang Yu's suicide by the Wu River, leaving more room for audience interpretation. During the script's conceptualization, techniques for scene composition, transitions, and shooting methods were meticulously planned to maximize the charm of watercolor art. The film includes numerous empty shots and panoramic views, not only to unfold the plot but also to showcase the artistic appeal of watercolors. The watercolor scenes and characters' expressions were pre-designed to highlight the artistic characteristics of watercolor. By combining digital effects simulations with the effect of watercolor hand-drawing in specialized scenes, the entire work achieves a more harmonious visual presentation and a consistent artistic style.

6.1.2 Art design

1) Character Design

According to the digital watercolor animation model, the art design link in the pre-production stage should pay attention to making full use of the characteristics of watercolor art. The designed screen elements should be easy to promote the development of the storyline, and the initial setting should adopt a realistic art style. Finally, it should fully combine the use of digital technology. Considering the background of the story and the location and time setting, the creative idea is to first extract keywords from the core parts of the characters and scene elements, and then simulate them with artificial intelligence technology to obtain more creative possibilities, and then make manual modifications. Manual modifications are made by combining hand-painting and digital painting. Combined with the above factors, the specific production details are as follows:

In the art and design production phase, the process begins with establishing the animation script and designing character images based on the characteristics of watercolor art. The two main characters in the story, "Xiang Yu" and "Yu Ji," were initially rendered using artificial intelligence technology to simulate some cases, in accordance with the requirements of the "digital watercolor animation" model. The chosen language models were Gemini and Copilot (powered by DALL·E 3), with the prompt being, "Please provide a realistic animated character design for Xiang Yu from the story of 'Farewell My Concubine,' in a watercolor art style." The same method was also used to test the female protagonist, "Yu Ji."



T Please provide a realistic watercolor art style suitable for the animated character of Xiang Yu in the Chinese story of Farewell My Concubine.



◆ Sure, here is a realistic watercolor art style suitable for the animated character of Xiang Yu in the Chinese story of Farewell My Concubine:



Figure 45 Xiang Yu generated by Gemini(homemade)



"Xiang Yu Farewell My Concubine watercolor art style"

Designer

由 DALL-E 3 提供支持

14

Figure 46 Xiang Yu generated by DALL-E 3(homemade)

It is evident that current language models still face significant challenges in character design for animation, as highlighted by various issues that arise during the process of generating character images with artificial intelligence. Firstly, language models struggle to accurately understand specialized terminology, such as "watercolor art style." Even when authors attempt to use related keywords for "watercolor," the results remain unsatisfactory, which deviates from the original intent of the sample creation. Secondly, the generated images lack relevance to the story theme. Additionally, the characters produced are not suitable for animation performance; they often resemble illustrations rather than embodying the simplicity, flexibility, and structural clarity typical of animated character design. Lastly, tests have shown that DALL·E is unable to handle color design tasks effectively, while Midjourney struggles with recognizing complex line art, leading to results that do not meet expectations.



Figure 47 Generated by DALL·E 3(homemade)

To test the development direction of artificial intelligence technology, we performed another generation simulation after completing the character design line art. We added the designed character images to make the generated images more accurate in relation to the prompt words. Considering that DALL·E is a text-to-image model based on CLIP and diffusion models, which maintains good semantic consistency in

the generated images, we continued to use the DALL·E engine for testing. The prompts used were the same as those from the previous stage of generation.

After trying again, the results still do not meet expectations. Although AI character generation technology has a wide range of applications, including game development, film, and animation production, the design of characters in animated films involves various details such as appearance, clothing, styling, and posture. While it can address some limitations of traditional character design methods, it does not fully solve the problem for the current sample production.

Ultimately, the watercolor hand-drawn technique was used, integrating the script's theme and the characteristics of watercolor art. After hand-drawing, the images were scanned and converted into electronic files, followed by detailed modifications and coloring in Adobe Photoshop. The primary principle was to express watercolor aesthetics: the forms feature soft, flowing lines and subtle color gradients that mimic the fluidity of watercolor paints. This technique imparts a light, fluid, and organic beauty to the characters.

Another key aspect is emotional expression. Despite the stylized appearance, the characters in the film are highly expressive. Their facial features, body language, and color palettes are meticulously designed to convey a range of emotions from joy and surprise to sadness and contemplation. The watercolor style is particularly suited for emotional expression because the soft blending of colors can subtly convey nuanced feelings.

Additionally, minimalism in detail was maintained. The character design in "digital watercolor animation" achieves a delicate balance between detail and simplicity. Although the characters have distinctive features and recognizable forms, they are not overly detailed or presented in a photo-realistic style. This minimalist approach keeps the focus on the overall emotional impact and feel of the characters.

Finally, attention was paid to harmony with the environment. The character designs seamlessly blend with the watercolor landscapes and backgrounds, creating a cohesive and visually harmonious world. The characters' soft, gentle colors and flowing lines echo the organic beauty of the natural environment, enhancing the film's immersive atmosphere.



Figure 48 The character design for "Xiang Yu" (homemade)

Historical records depict Xiang Yu's personality and actions as deeply contradictory, embodying both heroic valor and ruthless tyranny, as well as a mix of arrogance and loyalty. He has become a historical figure who evokes both admiration and contempt. His life is both a grand epic of heroism and a thought-provoking tragedy. However, due to time constraints in the sample, it wasn't possible to fully showcase his character's complexity. Therefore, to meet the sample requirements, we have aimed to portray him as an exceptionally brave and talented general. His imposing physique and characteristic Chinese hairstyle highlight his martial prowess and commanding presence, with particular emphasis placed on his upper body and arms.

In accordance with the script, the character's proportions follow a realistic adult scale of 7 heads tall. The costume design was based on historical references; many costumes in animated films are improved and innovatively designed from existing styles. For example, in period films, costumes often share a similar base design according to the era depicted. We first identified the costume characteristics of the period in which the story is set to faithfully reproduce the era's features. Additionally, we focused on accurately rendering the materials used in the clothing. A

key aspect of this process was the special expressiveness of watercolor, utilizing its transparent and dynamic qualities in the character design. Overall, the color scheme of the character is warm.



Figure 49 Character Design of "Yu Ji" (homemade)

The design of the female protagonist, Yu Ji, also employs a similar technical approach. While the overall artistic style and coloring medium remain watercolor, there are distinctions in how the character is portrayed. First, aside from the obvious differences in body structure compared to male characters, the focus is on the depiction of facial features. In this design, special attention was given to the eyes, chin, nose, hairline, and facial contours, aiming to express Yu Ji's gentle, delicate, and endearing feminine traits.

Secondly, historical records provide very limited descriptions of Yu Ji, but later literary and artistic works have richly and dramatically shaped her image. In summary, Yu Ji is a legendary figure from ancient China known for both her beauty and talent. She loyally accompanied Xiang Yu, the Hegemon-King of Western Chu, until the tragic end. Consequently, her attire was meticulously designed with a hairpin on her head and elaborate clothing, complemented by scenes of her playing the guzheng and dancing, aligning perfectly with the archetype of a classical Chinese beauty.

Furthermore, the background colors were pre-selected to be predominantly cool tones, so Yu Ji's color palette was chosen to be warm. The colors are relatively simple, with no significant hue variations, focusing instead on changes in purity and brightness to highlight the watercolor art characteristics. Finally, the patterns on her clothing were inspired by representative textures of aristocratic attire from the Qin Dynasty to the Western Chu period.

2) Scene Design

According to the digital watercolor animation model, the art design link in the pre-production stage should pay attention to making full use of the characteristics of watercolor art. The designed scene should be convenient for character performances, and the initial setting should adopt a realistic art style. Finally, it should fully combine the use of digital technology. Considering the story background and the location and time setting, the creative idea is to first extract keywords from the core parts of the characters and scene elements, and then simulate them with artificial intelligence technology to obtain more creative possibilities, and then make manual modifications. Manual modifications are made by combining hand-painting and digital painting. Combined with the above factors, the specific production details are as follows:

 Animation scene of bamboo forest in Western Chu period of China in realistic watercolor art style

 Sure, here is an animation scene of a bamboo forest in the Western Chu period of China in a realistic watercolor art style:



Figure 50 Gemini generates animation scenes(homemade)

After finalizing the story theme and realistic art style, the author also plans to use prompt-based artificial intelligence technology to simulate and generate a portion of the scenes, aiming to improve production efficiency. The Gemini and DALL·E models have been selected for this purpose. The prompts include: "Bamboo Forest in Western Chu period China, realistic art style, watercolor technique, animation scene" and "Wujang Riverbank in Western Chu period China, realistic art style, watercolor technique, animation scene."



Figure 51 Animation scene generated by DELL·E 3(homemade)

After multiple attempts, the author found that artificial intelligence technology offers a higher level of precision in generating animation scenes compared to character functions. However, several issues have emerged. Firstly, the style of the generated scenes cannot fully match the style of the characters. Secondly, the content

generation exhibits high randomness, necessitating continuous use of prompts to guide the generation direction. Despite this, the results fall short of the creator's requirements for animation scenes. The generated content does not accurately match the storyline or task performance needs, such as the required stage space for character performances and the technical conditions described in the script. Finally, the watercolor effect is insufficiently pronounced, which undermines the purpose of this research.

After several attempts, the author selected and refined the generated content, aligning it with the storyline and the artistic style of the characters. The animation scenes were re-designed using watercolor techniques and Adobe Photoshop for detailed adjustments and color correction. This approach not only addressed the aforementioned issues but also enhanced the application of watercolor art in animation scene design, making the watercolor characteristics more pronounced.



Figure 52 Comparison between sample scene 1 and Tuoh River in the north (homemade)

Scene 1 primarily serves as the film's opening, displaying the title on the screen. The image features two mountain peaks: the left side is rendered in warm colors, while the right side is painted in cool colors. This is also in line with the

staging techniques, where the camera moves from left to right, using color to hint at the protagonist's impending misfortune. The drawing process involves sketching the outlines and perspective relationships with pencil, followed by watercolor painting. Some ink brush techniques are incorporated to complete the detail work. Given that the story is set in Gaixia, with its ruins located in the eastern part of Haocheng Town, Guozhen County, China, and bordered by the Tuo River to the north, the author gathered relevant materials for the scene design and made additional adjustments to suit the narrative needs. Since the current shot uses a long view and involves camera movement, the scene is designed with a broader scope to meet the shooting requirements.

The two primary scenes in the film are the bamboo forest and the banks of the Wu River. In fact, most of the key scenes take place in these settings. As a result, we repeatedly tested and refined the integration of characters with these two main scenes during the design process. Multiple design options were created to showcase the scenes from various angles, aligning with the development of the plot.



Figure 53 Evaluation of scene and character integration in a Bamboo Forest Environment(hOMEMADE)

The design of the bamboo forest scene also required the development of multiple options to meet the varying needs of different shots. The bamboo forest animation scenes were all completed using watercolor painting. The scene features soft edges, diverse textures, and unpredictable effects, all characteristic of the watercolor art style. The composition of the scene is carefully arranged to be visually appealing. The bamboo forest is set in the background, creating a sense of depth, while the boat is placed in the foreground to draw the viewer's attention into the scene. The colors are soft and harmonious, evoking a sense of tranquility. The scene is also clear and easily understandable; viewers can quickly grasp that the setting is a bamboo forest with a boat on the river. The movement of the boat adds an element of interest to the scene.

Given that the target audience is primarily adults, the use of watercolor is well-suited for creating more mature animation. The watercolor art style can be adapted to various tones, from light-hearted to serious, depending on the story's mood. The design's soft edges reflect the natural transparency of watercolor paints, allowing elements to blend seamlessly, which imparts a dreamy quality to the artwork. The diverse textures are achieved through the application of paint in various ways, from thin washes to thick layers, adding variety and interest to the watercolor paintings. Finally, the unpredictable nature of watercolor paints, known for their spontaneous behavior, may be frustrating to some artists but also serves as a source of creativity for the current work.



Figure 54 Some "Bamboo Forest" scenes in the animation sample(homemade)

In the latter part of the film, especially towards the ending, the events take place by the Wujiang River. Therefore, the design of the riverbank not only needs to reference the original topography but also serve to reflect the theme, vividly expressing the tragic end of the hero's journey. The scene features a harmonious blend of soft and earthy tones, perfectly capturing the tranquility of the lake's surface. Gentle blues, greens, and browns create a sense of calm and serenity, while subtle warm accents, such as the red tones of the boat, add visual interest without disrupting the overall tranquility. The effective use of negative space, or the unoccupied areas around the main subject, enhances the overall composition. The expansive sky and surrounding landscape, depicted with minimal brushstrokes, draw the viewer's attention to the boat and its serene journey across the lake.

The scene enhances the graininess of the image, a unique feature of watercolor paintings, subtly present throughout. This effect is caused by the uneven deposition of pigment particles on the paper, adding subtle texture and depth to the colors. The fine grain of the lake's surface and the weathered appearance of the boat heighten the scene's realism. Additionally, the scene showcases the skillful use of layering and washes, hallmarks of watercolor art. The artist has meticulously built layers of transparent colors, seamlessly blending each layer with the one beneath. This technique creates a sense of depth and dimension, bringing the serene lakeside view to life. The artist also paid careful attention to the use of light and shadow in the scene, cleverly employing them to enhance the depth and three-dimensionality of the composition. The soft sunlight filtering through the clouds and the subtle shadows cast by the boat contribute to a sense of realism and atmosphere.

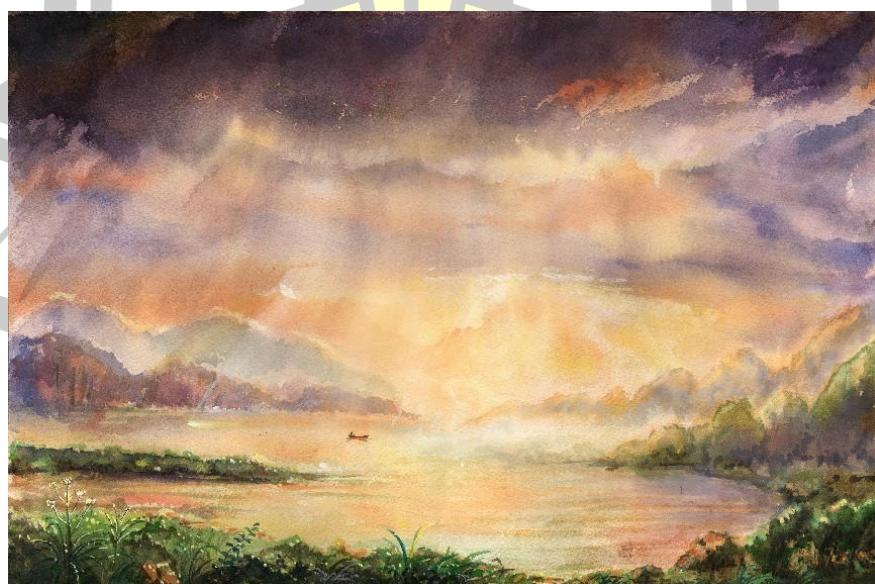


Figure 55 Atmosphere of the "Wujiang" scene (homemade)

3) Prop Design

According to the digital watercolor animation model, the art design in the pre-production stage should pay attention to making full use of the characteristics of watercolor art. The props designed should be convenient for the role performance, and the initial setting should adopt a realistic art style. Finally, the use of digital technology should be fully combined. Considering the background of the story and the setting of the place and time, the creative idea is to design through the combination of hand-painting and digital painting according to the needs of the character design and the plot. Combined with the above factors, the specific production details are as follows:

In the prop design phase, due to the relatively small workload, artificial intelligence technology was not used for simulation and generation. Instead, we relied on hand-drawing combined with post-processing in Adobe Photoshop. The focus was primarily on showcasing watercolor aesthetics and incorporating the watercolor style into the prop design. Soft edges, blended colors, and subtle textures were used to mimic the appearance of traditional watercolor paintings. Hard lines and stark contrasts, which might detract from the overall watercolor effect, were avoided. Next, the narrative context was considered, designing props that matched the story's setting, period, and genre. For instance, weapons used by Xiang Yu and the guzheng played by Yu Ji were designed accordingly. Additionally, the props needed to be both functional and visually appealing. They should not only serve a narrative purpose but also be visually engaging. Attention was paid to the details of each prop, including shape, color, and texture, to ensure they complemented the overall visual style of the animation. Finally, while the props should be visually striking, overdesign was avoided. The props were designed to subtly support the narrative without distracting from the main characters or the overall story. First, let's discuss the connection between the main characters in the film and the "jade pendant." In 206 BC, Xiang Yu declared himself the "Hegemon-King of Western Chu" and established his capital in Pengcheng (modern-day Xuzhou). He commissioned skilled jade artisans to carve a pair of "dragon and phoenix" pendants as a token of love and formally married Yu Ji. He decreed that the royal family should not accept concubines or additional wives. In honor of Xiang Yu and Yu Ji's unwavering love, the dragon and phoenix pendants became a popular symbol among the people. The jade pendant features an intricate floral design, showcasing the art and craftsmanship of the time. Its overall shape is a simple oval, providing a clean canvas for the complex patterns. The use of negative space around the design adds lightness and transparency, while subtle changes in

color and shading create depth and dimension. The central motif of the pendant is the dragon and phoenix pattern, representing a culturally or symbolically significant type of dragon and phoenix from the Western Chu period. The design is stylized, with elongated and slightly curved elements that give it an elegant and graceful appearance. The smooth, flowing lines and subtle color gradients mimic the shape of the pendant, enhancing the design's authenticity and charm. The color scheme is limited to a range of soft greens and whites, reflecting the earthy tones and natural beauty of the time. Green is particularly significant as it is associated with growth, harmony, and prosperity in many cultures. The subtle tonal variations between the elements create depth and a sense of three-dimensionality, while the overall soft hues add a feeling of tranquility and peace. During the Western Chu period, the jade pendant held cultural and symbolic significance for its owner. Jade was highly valued in ancient China for its beauty, durability, and auspicious properties.



Figure 56 "Jade Pendant" prop design in animation sample(homemade)

The final design features hollowed-out lines that evoke the smooth brushstrokes of watercolor paintings, creating a sense of movement and vitality. The

bright green of the jade pendant symbolizes growth, energy, and prosperity. It also represents the natural world and the harmonious coexistence between humanity and nature. The soft hues of the watercolor painting enhance the intensity of the colors, making the pendant the focal point. Moreover, the jade pendant's design seamlessly integrates with the watercolor bamboo forest, forming a cohesive and visually harmonious composition. The pendant's green complements the vibrant green tones of the bamboo, while its swirling pattern echoes the graceful curves of the bamboo stalks.



Figure 57 Xiang Yu's weapon design in the animation sample(homemade)

The important weapon in question is Xiang Yu's weapon. According to the "Records of the Grand Historian, Volume Seven: The Biographies of Xiang Yu," it is recorded that "During the Han Dynasty, there was a skilled archer named Lou Fan. When challenged by Chu three times, Lou Fan would kill them each time. Xiang Wang, enraged, donned armor and wielded a spear to issue the challenge himself." Xiang Yu is said to have used a large spear. However, the Ming Dynasty novel "The Romance of the Western Han" mentions that he used a 霸王枪 (Overlord Spear). It is said that Xiang Yu's uncle, Xiang Liang, had a custom-made Overlord Spear made

for him, but this is not substantiated by historical records. Therefore, many films and TV dramas depict Xiang Yu with an Overlord Spear to highlight his heroic demeanor. Based on this, a preliminary design for a long-handled weapon was created. However, after testing and considering the development of the plot and character performances in this work, it was found that using a long-handled weapon was inconvenient for character portrayal. The main reason is that horseback combat is not designed in the story, and given Xiang Yu's character design, which exaggerates the upper body, it was decided to design a distinctive short-handled weapon that reflects the characteristics of cold weapons from the Western Chu period. The design, based on authentic historical images, is shown in the Figure 84 below.

The designs for the other props were completed using the above method and were ultimately showcased in the work following testing.

6.1.3 Role performance

According to the digital watercolor animation model, the role performance in the production stage should be completed using digital software to reflect the convenience of digital animation production. At the same time, we should also try to use artificial intelligence technology to simulate some dynamic effects. Combined with the above factors, the specific production details are as follows:

After testing, AI cannot currently generate animations using the scenes and characters designed by the author. Additionally, the AI lacks stability, with frequent changes in character appearance. Finally, the AI is unable to accurately interpret the script and generate animations according to its requirements. The author believes that the artistic core of animation lies in artistic style and performance, which represent the elevation of human originality and thought, distinguishing it from the mechanical imitation of AI. According to the art philosopher George Dick, art must be created by artists who understand the meaning of the creation and should be aimed at an audience capable of appreciating this art. When creating animated characters, AI can only abstract prominent features through multilayered learning networks and combine them in a collage, lacking human creativity and aesthetic capability. For instance, Hayao Miyazaki's works demonstrate the imagination and emotional transmission of human artistic creation, but AI machines cannot experience the complexities of human emotions and thus cannot autonomously create art with depth and resonance. Moreover, AI's "performance" is more like an emergency response to external stimuli, lacking the rich internal thought and emotional expression of humans, and is unable to create truly artistic works in animation design and performance.

To enhance production efficiency and demonstrate the convenience of digital animation, the author utilized Blender software to create 3D models of characters through character design. To better integrate these models with 2D animation scenes, the author chose to use 3D-to-2D rendering technology for character animation production. This approach allows for a faster completion of character performances.

Firstly, the male protagonist, Xiang Yu, is portrayed as a tragic hero in the drama. The author depicts Xiang Yu, the King of Western Chu, as a complex and compelling character, embodying the qualities of a tragic hero. His defining characteristics include Firstly resilience. Xiang Yu's unwavering determination and resolute spirit are evident in his expressions, body language, and interactions with other characters. Despite facing immense challenges, he relentlessly pursues victory. Secondly, emotional intensity. While Xiang Yu appears resolute on the outside, the turbulence and depth of his emotions are conveyed through subtle nuances in his facial expressions and actions. His moments of pain, anger, and despair resonate deeply with the audience. Lastly, the tragic downfall. Xiang Yu's tragic decline permeates the entire film, culminating in a heart-wrenching climax. His performance captures the weight of failure and its profound impact on him.



Figure 58 Animation sample: some character performance 1(homemade)

The character of Yu Ji, the female lead, vividly portrays her love and loyalty to Xiang Yu, adding an emotional dimension to their relationship. Her tragic fate highlights the human cost of war. Yu Ji's dance and guzheng performance are inspired by many relevant artistic videos. In particular, the dance movements draw from the representative "Chu Dance" of the Western Chu period in China, where the story is set. As a traditional dance, its development has continued into modern times, and it has been preserved and maintained in contemporary society. Chu Dance is not only reflected in the dance culture of the Miao people, such as the Tchao Tang dance and the Bai Shou dance, which are performed during festivals to showcase the unique charm and cultural connotations of Chu Dance, but also has a significant presence in the dance culture of the Northwestern Hubei region, particularly in the Duan Gong dance. Although the latter has a considerable local impact, it is less well-known

outside the region compared to Chu Dance. These dance forms not only highlight the uniqueness of Chu culture but also reflect the artistic value and cultural significance of Chu Dance.



Figure 59 Animation sample: some character performance 2(homemade)

The supporting characters in the film played a crucial role in enriching the narrative and highlighting the complexity of the main characters. Their performances contributed significantly to the overall emotional impact of the movie.

6.1.4 Other production steps

According to the digital watercolor animation model, except for the above production links, the other parts that are not produced follow the digital animation production process to complete the subsequent work. The specific production details are as follows:

Apart from the production stages involved in the "digital watercolor animation" model, all other production processes were completed using standard digital animation methods. The compositing and editing work were primarily carried out using Adobe After Effects and Adobe Premiere Pro, with color grading done in DaVinci Resolve.

6.2 The evaluation results of the produced animation

Through the samples of animated short films produced in the previous stage, we conducted an assessment on the audience's acceptance and preference for watercolor animation, the effectiveness of watercolor animation in expressing emotions and narratives, the audience's willingness to create and consume watercolor animation in the future, and the differences in the acceptance of digital watercolor animation by audiences in different countries and regions. The above four aspects were evaluated in the form of a questionnaire survey, and the data results were quantitatively analyzed using SPSS software.

6.2.1 The acceptance and preference for digital watercolor animation

In the story creation process of digital watercolor animation, artists must integrate visual art, animation technology, and narrative techniques to create unique and moving animation works. By carefully utilizing color matching, lighting effects, dynamic images, and narrative pacing, creators can significantly enhance the emotional power and visual appeal of the story.

These special characteristics are mainly reflected in:

(1) Uniqueness of visual style: Digital watercolor animation often presents a distinctive visual style, characterized by soft edges and rich color layers with unique charm. When creating a story, special attention must be paid to the harmonious integration with visual effects to ensure the overall style's consistency.

(2) Shaping of emotion and atmosphere: Ink-style animation helps deeply express emotions and scenarios. Creators need to leverage this feature and enhance emotional expression through changes in light and color during the story creation process.

(3) Integration of traditional art and digital technology: Digital watercolor animation combines the texture of traditional painting with the flexibility of digital technology. In the narrative process, creators need to consider how to use this integration to create unique visual effects.

In addition to being mindful of the unique aspects, it is crucial to consider the use of techniques when crafting a story. In the creation of digital watercolor animations, the choice of colors plays a decisive role. Various colors can evoke different emotions and atmospheres, so artists must carefully consider how to select colors to enhance the storyline. Moreover, dynamic presentation is a significant difference between animation and static artwork. Creators need to plan smooth and expressive movements to maintain the narrative rhythm and visual appeal. Furthermore, the use of light and shadow in watercolor animation can enhance the three-dimensionality and depth of the images. Creators should employ techniques of light and shadow to emphasize key scenes and plot twists in the story. The rhythm of digital watercolor animation can be adjusted through scene transitions, motion speed, and music. Creators must ensure that the pacing of the story aligns with the visual experience to continuously captivate the audience's interest. Ultimately, given that watercolor animation can delicately depict subtle emotional changes, creators need to pay close attention to the characters' facial expressions and body language to accurately convey emotional details.

6.2.2 The acceptance and preference for digital watercolor animation

In the specific projects of the current test, information collection and data analysis are mainly carried out on three elements: Visual appeal, Artistry and creativity, and Uniqueness. The results are shown in the following table:

Table 5 The acceptance and preference for digital watercolor animation

Factors and questions	Chinese		Thai	
	Mean (M)	S.D.	Mean (M)	S.D.
Visual appeal	4.60	0.35	4.15	0.61
1. I find the watercolor style in animated films visually appealing.	4.74	0.44	4.32	0.72
2. I really enjoy the depiction of lines and textures in the film.	4.60	0.49	4.30	0.72
3. I believe the integration of watercolor art improves the depiction of colors and the liveliness of the visuals.	4.54	0.55	4.17	0.76
4. Compared to frame-by-frame hand-drawn animation techniques, I find character performances created with digital software more engaging.	4.03	0.91	3.72	0.77
Artistry and creativity	4.62	0.40	4.24	0.61
1. The use of the watercolor style adds a sense of artistry and creativity to the animated film.	4.63	0.48	4.45	0.65
2. Using digital watercolor animation to portray ethnic cultural content is a more fitting approach.	4.57	0.60	4.04	0.83
3. The inclusion of watercolor art enhances the artistic expression of animation.	4.51	0.50	4.26	0.82
4. Compared to more common animation techniques, the watercolor style offers a refreshing change.	4.63	0.48	3.87	0.79
Uniqueness	4.13	0.63	4.47	0.48
1. I believe the use of watercolor art effectively enhances the expression of the story's theme.	4.57	0.55	4.40	0.71
2. I think watercolor animation helps create a unique narrative experience.	4.60	0.49	4.23	0.78
3. The artistic design of the watercolor style makes it easier for me to immerse myself in the story while watching the film.	4.23	0.68	3.81	0.74
4. The watercolor style supports and enhances the overall narrative through its impact on dialogue and character interactions.	4.34	0.53	4.00	0.83

Table 5 shows the acceptance and preference for digital watercolor animation of Chinese students and Thai students. The evaluation results are satisfactory from the three specific indicators. The mean and S.D. in each factors indicated as follows:

Visual appeal: Chinese students have the highest level of acceptance and preference of this aspect ($M=4.60$, $S.D.=0.35$), while Thai students have the highest level of acceptance and preference of this aspect ($M=4.15$, $S.D.=0.61$). The questions in this factor with the highest mean, Thai and Chinese students have consistent opinions, namely “watercolor style in animated films visually appealing” followed by “enjoy the depiction of lines and textures in the film”.

Artistry and creativity: Chinese students have the highest level of acceptance and preference of this aspect ($M=4.62$, $S.D.=0.40$), while Thai students have the high level of acceptance and preference of this aspect ($M=4.42$, $S.D.=0.61$). The questions with the highest mean and Thai and Chinese students have the same opinion is “the watercolor style adds a sense of artistry and creativity to the animated film”.

Uniqueness: Chinese and Thai students have similar levels of acceptance and preference which is the high level, $M=4.13$ $S.D.=0.63$, and $M=4.47$ $S.D.=0.48$ respectively. The questions with the highest mean, Thai and Chinese students have different opinion; Chinese students’ opinion on question “watercolor animation helps create a unique narrative experience” with the highest average, while Thai opinion was “the watercolor style supports and enhances the overall narrative through its impact on dialogue and character interactions”.

6.2.3 The effectiveness of watercolor animation in expressing emotions and narratives

In the specific items of the current test, information collection and data analysis are mainly carried out on the three elements of the influence of emotional expression, clarity of non-verbal expression, and narrative support. The test results are shown in the following table:

Table 6 The effectiveness of watercolor animation in expressing emotions and narratives

Factors and questions	Chinese		Thai	
	Mean(M)	S.D.	Mean(M)	S.D.
The influence of emotional expression	4.54	0.50	4.29	0.65
1. The watercolor style makes the emotions of characters in animated films more impactful.	4.34	0.68	4.13	0.85
2. The visual softness of watercolor animation improves my perception and interpretation of character interactions.	4.51	0.61	4.06	0.89
3. I believe the use of watercolor art effectively enhances the expression of the story's theme.	4.57	0.55	4.40	0.71
Clarity of non-verbal expression	4.27	0.57	3.93	0.68
1. Compared to other animation styles, the verbal expressions of characters in watercolor animated films feel more authentic.	4.14	0.64	3.66	0.93

Factors and questions	Chinese		Thai	
	Mean(M)	S.D.	Mean(M)	S.D.
2. Watercolor animation enhances the subtleties of characters' emotions.	4.29	0.82	4.00	0.83
3. The blending effects of watercolor help emphasize key moments of significant emotional shifts in characters.	4.34	0.72	4.11	0.84
4. Non-verbal cues (such as facial expressions and gestures) in watercolor animation are clearer and more expressive.	4.23	0.73	3.85	0.83
Narrative support	4.28	0.50	3.90	0.67
1. The artistic design of the watercolor style makes it easier for me to immerse myself in the story while watching the film.	4.23	0.69	3.81	0.74
2. The watercolor style supports and enhances the overall narrative through its impact on dialogue and character interactions.	4.34	0.53	4.00	0.83

Table 6 shows the effectiveness of watercolor animation in expressing emotions and narratives of Chinese students and Thai students. The evaluation results are satisfactory from the three specific indicators. The mean and S.D. in each factors indicated as follows:

The influence of emotional expression: Chinese students have the highest level of acceptance and preference of this aspect ($M=4.54$, $S.D.=0.50$), while Thai students have the highest level of acceptance and preference of this aspect ($M=4.29$, $S.D.=0.65$). The questions in this factor with the highest mean, Thai and Chinese students have consistent opinions, namely “the use of watercolor art effectively enhances the expression of the story's theme. followed by “The watercolor style makes the emotions of characters in animated films more impactful”.

Clarity of non-verbal expression: Chinese students have the highest level of acceptance and preference of this aspect ($M=4.27$, $S.D.=0.57$), while Thai students have the high level of acceptance and preference of this aspect ($M=3.93$, $S.D.=0.68$). The questions with the highest mean and Thai and Chinese students have the different opinion is “Non-verbal cues (such as facial expressions and gestures) in watercolor animation are clearer and more expressive”.

Narrative support: Chinese and Thai students have similar levels of acceptance and preference which is the high level, $M=4.28$ $S.D.=0.50$, and $M=3.90$ $S.D.=0.67$ respectively. The questions with the highest mean, Thai and Chinese students have different opinion; Chinese students' opinion on question “the artistic design of the watercolor style makes it easier for me to immerse myself in the story while watching the film” with the highest average, while Thai opinion was “the use of watercolor art effectively enhances the expression of the story's theme”.

6.2.4 Audience's willingness to create and consume watercolor animation in the future

In the specific project of the current test, we mainly collect information and analyze data on three elements: watching willingness, creative interest, and industry value recognition. The test results are shown in the following table:

Table 7 willingness to create and consume watercolor animation in the future

Factors and questions	Chinese		Thai	
	Mean(M)	S.D.	Mean(M)	S.D.
Watching willingness	4.54	0.50	4.14	0.77
1. The watercolor style makes the emotions of characters in animated films more impactful.	4.20	0.71	4.28	0.71
2. Compared to other animation styles, the verbal expressions of characters in watercolor animated films feel more authentic.	4.66	0.48	3.40	1.01
3. I am interested in consuming digital watercolor animation films.	4.60	0.55	4.23	0.78
Creative interest	4.31	0.71	4.08	0.88
1. I would like to explore more content in the digital watercolor animation style.	4.49	0.70	4.06	0.84
2. I am interested in learning the techniques of digital watercolor animation.	4.31	0.71	4.06	0.91
3. I might create my own digital watercolor animations in the future.	3.89	0.86	3.83	1.02
Industry value recognition	4.61	0.40	4.14	0.72
1. By watching the animated short film, I look forward to seeing animations that incorporate other traditional art techniques.	4.43	0.65	4.19	0.82
2. I believe digital watercolor animation is a unique and valuable art form.	4.63	0.54	4.21	0.778
3. I am confident in using tools for creating digital watercolor animations.	4.49	0.56	3.85	0.80
4. I believe digital watercolor animation adds value to the animation industry.	4.71	0.45	4.38	0.87

Table 7 shows the willingness to create and consume watercolor animation in the future of Chinese students and Thai students. The evaluation results are satisfactory from the three specific indicators. The mean and S.D. in each factors indicated as follows:

Watching willingness: Chinese students have the highest level of acceptance and preference of this aspect ($M=4.54$, $S.D.=0.50$), while Thai students have the highest level of acceptance and preference of this aspect ($M=4.08$, $S.D.=0.88$). The questions in this factor with the highest mean, Thai and Chinese students have consistent opinions, namely “the watercolor style makes the emotions of characters in animated films more impactful”.

Creative interest: Chinese students have the highest level of acceptance and preference of this aspect ($M=4.31$, $S.D.=0.71$), while Thai students have the high level of acceptance and preference of this aspect ($M=3.93$, $S.D.=0.68$). The questions with the highest mean and Thai and Chinese students have the same opinion is “create their own digital watercolor animations in the future”.

Industry value recognition: Chinese and Thai students have similar levels of acceptance and preference which is the high level, $M=4.61$ $S.D.=0.40$, and $M=4.14$ $S.D.=0.72$ respectively. The questions with the highest mean, Thai and Chinese students have different opinion; Chinese students' opinion on question “confident in using tools for creating digital watercolor animations.” with the highest average, while Thai opinion was “digital watercolor animation adds value to the animation industry”.

6.2.5 Comparison of the differences in the acceptance of digital watercolor animation

In the specific items of the current test, we mainly combined all the elements of the first three test items to collect information and analyze data and compared the test results of Chinese and Thai students. The different with significant at 0.01 (confidence level at 99%), different with significant at 0.05 (confidence level at 95%) test results are shown in the following table:

Table 8 shows the comparison of 35 Chinese and 47 Thai students' opinions on various factors of using watercolor techniques in animation production. It was found that there was a significant difference in the level of opinion on factors of visual appeal ($t3.76$, $Sig.=0.00$), artistry and creativity ($t3.19$, $Sig.=0.00$), uniqueness ($t2.60$, $Sig.=0.01$), clarity of non-verbal expression ($t2.33$, $Sig.=0.02$), narrative support ($t2.81$, $Sig.=0.00$), watching willingness ($t2.60$, $Sig.=0.01$), and industry value recognition ($t3.43$, $Sig.=0.00$). Moreover, these results suggest that Chinese students have a higher level of opinion than Thai students. While factors of the influence of emotional expression ($t1.83$, $Sig.=0.07$), and creative interest ($t1.25$, $Sig.=0.21$) were not significant difference in the level of opinion of Chinese and Thai students.

Table 8 Comparison of the differences in the acceptance of digital watercolor animation

Factors	Nationality	n	Mean	S.D.	t	Sig.
Visual appeal	Chinese	35	4.60	0.35	3.76	0.00**
	Thai	47	4.15	0.61		
Artistry and creativity	Chinese	35	4.62	0.40	3.19	0.00**
	Thai	47	4.24	0.61		
Uniqueness	Chinese	35	4.13	0.63	2.60	0.01**
	Thai	47	4.47	0.48		

Factors	Nationality	n	Mean	S.D.	t	Sig.
The influence of emotional expression	Chinese	35	4.54	0.50	1.83	0.07
	Thai	47	4.29	0.65		
Clarity of non-verbal expression	Chinese	35	4.27	0.57	2.33	0.02**
	Thai	47	3.93	0.68		
Narrative support	Chinese	35	4.28	0.50	2.81	0.00**
	Thai	47	3.90	0.67		
Watching willingness	Chinese	35	4.54	0.50	2.60	0.01**
	Thai	47	4.14	0.77		
Creative interest	Chinese	35	4.31	0.71	1.25	0.21
	Thai	47	4.08	0.88		
Industry value recognition	Chinese	35	4.61	0.40	3.43	0.00**
	Thai	47	4.14	0.72		

There are statistically significant differences between Chinese and Thai students in visual appeal, artistry and creativity, uniqueness, clarity of non-verbal expression, narrative support, watching willingness, and industry value recognition. No significant differences were found in the influence of emotional expression and creative interest.

These results suggest that while both groups generally appreciate the new method, Chinese students tend to rate most aspects higher than Thai students, except for the uniqueness factor, where Thai students have a higher appreciation.



Chapter 7

Conclusion, Discussion, and Recommendation

This chapter mainly summarizes and discusses the entire research project, reviews the key points in the research process, completes the presentation of the research results and discusses them, and gives reasonable suggestions on the possibility of subsequent research.

7.1 Conclusion

7.1.1 Research methods

After clarifying the research background through literature reading and field investigation, this study analyzed the current situation of watercolor art and digital animation production and proposed research questions. In order to re-examine and analyze the expression of watercolor language from the perspective of animation production, and then propose a new method of watercolor language expression and communication in the digital animation production environment. Finally, based on the new method proposed in this study, a short animation sample was created and evaluated to demonstrate the effect of watercolor language technology in the digital animation production environment. Then, combined with the research questions, a literature reading with clear direction was conducted, and the two important independent variables of watercolor art and digital animation production were analyzed in detail. The theoretical framework of this project was established through the research results of this stage. Next, a three-stage research method was formulated for the subsequent specific research practice. The first stage used case analysis as the main research method, the second stage mainly used in-depth interviews and proposed a new model, and the main task of the third stage was to make sample animated movie through the proposed model and evaluation of the sample animation was assessed using a questionnaire by students in China and Thailand. Overall, the entire research process used a mixed research method, while giving full play to the respective strengths of qualitative and quantitative research.

7.1.2 Research conclusions

1) Watercolor art with modern animation technology

Through research, it is found that re-examining and analyzing the expression of watercolor language in animation production means combining the traditional techniques of watercolor art with modern animation technology to create animation works with unique visual effects and emotional expressions.

(1) Integration with storytelling: The visual style of watercolor animation should be closely integrated with the narrative content to enhance the emotion and

atmosphere of the story. Animators need to consider how to enhance the emotional level and visual narrative of the story through the fluidity and transparency of watercolor.

(2) Simulation of watercolor style: Animators need to understand the basic characteristics of watercolor painting, such as transparency, color fluidity and softness of edges. In a digital environment, this involves the use of specific software tools and effects to simulate the diffusion, bleeding and drying process of watercolor.

(3) Reproduction of texture and brushstrokes: The texture and brushstrokes of watercolor painting are key elements of its artistic expression. In the digital animation production process, these characteristics can be reproduced through digital brushes, layer blending modes and grain effects, giving the animation a texture similar to handmade watercolor paintings.

(4) Application of color theory: The selection and application of colors in watercolor animation should follow color theory to ensure visual harmony and emotional communication. Color transparency and overlay effects are particularly important in watercolor animation because they can enhance the atmosphere and depth of the scene.

(5) Innovation and Experimentation: Although watercolor animation is deeply influenced by traditional watercolor painting, animators can also explore new techniques and methods to create unprecedented visual effects. This may include combining effects from other media or developing customized tools and plug-ins to expand the expressiveness of watercolor animation.

2) The model "Digital Watercolor Animation"

Through the analysis of the results of the first phase of research and in-depth interviews with experts, the author proposed a "digital watercolor animation" model, which focuses on integrating the artistic characteristics of watercolor into the three-production links of digital animation creation: script writing, art design, and character performance.

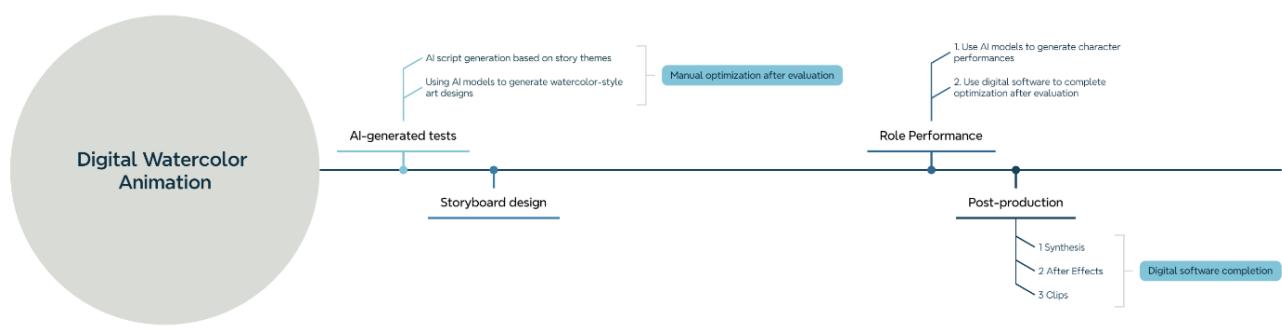


Figure 60 Validation of new methods

The "digital watercolor animation" model is an animation creation method that combines the visual effects of traditional watercolor art with modern digital technology. This model uses digital tools and software to simulate the rendering effects, transparency and color flow characteristics of watercolor paintings, thereby creating a watercolor-style picture in the animation.

The confirmation of the "digital watercolor animation" model combined with the opinions of expert interviews is as follows:

(1) The integration of creative design and digital art: animation modelers can create animation works that have both traditional watercolor beauty and modern aesthetic needs through the combination of creative design and digital art.

(2) The combination of technology and artistry: The digital watercolor animation model shows how to achieve innovation and development of artworks through technical means. This model not only retains the aesthetic characteristics of watercolor art, but also enhances its expressiveness and interactivity through digital means.

(3) Cross-media artistic exploration: The digital watercolor animation model is the product of cross-media cooperation between art and technology. It proves the rebirth of traditional art forms in the contemporary digital context, bringing new development directions and possibilities to the field of art.

(4) Importance of audience experience: Experts emphasize that the digital watercolor animation model not only provides visual enjoyment, but also meets the audience's diverse aesthetic needs, bringing a richer and deeper artistic experience to the audience.

In summary, the digital watercolor animation model is an innovative art form that reproduces the unique charm of watercolor art through technical means and opens up new creative space on this basis. The confirmation of this model by experts shows that it is the result of the integration of creative design, digital art and traditional painting techniques, showing the great potential of the combination of art and technology.

3) The results of animated short film samples evaluation

Animated short film samples were produced using the "digital watercolor animation" model, and a questionnaire was designed based on the samples and the main variables discovered in previous studies. Finally, tests were conducted on the audience's acceptance and preference for digital watercolor animation, the effectiveness of watercolor animation in expressing emotions and narratives, and the audience's willingness to create and consume watercolor animation in the future. The

test results reflected the high satisfaction of the audience participating in the test, including audiences from different countries and regions.

After completing the student evaluation, expert feedback was conducted. The expert group participating in the evaluation was selected by random sampling of the experts who participated in the interviews in the second stage. The specific feedback is as follows:

1) The story of *Farewell My Concubine* serves as an exceptional creative subject for digital watercolor animation, owing to its profound cultural connotations and intense emotional tension. The fluidity and soft color palette of watercolor enable the delicate portrayal of the characters' complex inner emotions. For instance, in the depiction of Consort Yu's sword dance, the watercolor rendering enhances the poetic quality and visual expansiveness of the scene, making the tragic fate of the character more tangible and expressive. This approach not only preserves the historical ambiance but also imbues the narrative with renewed artistic vitality.

2) The distinctive texture of digital watercolor animation is particularly well-suited for representing the operatic elements and classical atmosphere in *Farewell My Concubine*. In the animated short film, the diffusion effects of watercolor brushstrokes evoke the ethereal imagery of mist enveloping the stage and convey the fluidity of the characters' costumes, enriching the overall aesthetic experience. Simultaneously, the integration of digital tools ensures precise control over the watercolor effects, allowing the imagery to retain the organic flow characteristic of watercolor art while meeting the continuity and rhythm required for animation storytelling. This fusion offers the audience an immersive visual experience.

7.2 Discussion

1) Comparison of Chinese and Thai data analysis shows different results on emotional expression in digital watercolor animation

The special film language expression of emotion in animated films also highlights its unique charm, status, and cultural communication role in the field of communication and at the same time reflects the unique value of the flash point in the ever-changing modern society. (Dai,2022) The analysis of the animated short film samples showed that first, the background of the short film story was the Chu-Han period in China, and through the "Gaixia Song" at the end, Chinese audiences could easily understand the background of the story and the thoughts and feelings conveyed. *Farewell My Concubine* is a well-known allusion in China. Therefore, this part of the audience can more calmly grasp all the information conveyed by the film during the film, and it is easier to capture the audio-visual elements that interest them. Thai

audiences first lack sufficient Chinese cultural accumulation, feel unfamiliar with the story background, and need more time to understand the relationship between the characters, the contradictions of the story and other factors, which will not capture the feelings of the characters' emotional expression in time. Although the author has tried to weaken the story and emphasize the performance and scene effects when creating, it is still not sufficient. Therefore, in the future, more consideration needs to be given to how to closely connect the role performance with the story to reduce the difficulty of audience understanding.

Secondly, independent animations on social networks also play a role in constructing local identity. Through visual literacy and narrative, these animations reflect and negotiate cultural identity, engaging audiences by resonating with their cultural experiences (Ruslan, 2019). The collaboration in animation education between China and Thailand highlights cultural exchanges that influence animated film production. While both countries engage in educational partnerships, the distinct cultural backgrounds lead to different approaches in animation curricula, which in turn affect the thematic and stylistic elements of animated films produced in each country(Xiang, 2020).The difference between Chinese and Thai cultures is that Chinese audiences are more accustomed to accepting implicit and euphemistic cultural outputs, and they still maintain the same habits in the process of cultural expression and communication, while Thai audiences do not maintain the same acceptance environment. Therefore, in the subsequent creation, we should improve the way of role performance and use more direct, clear and targeted methods to express. Combining the above analysis can improve the acceptance of the influence of emotional expression.

2) Comparison of Chinese and Thai data analysis shows different results on creative interests in digital watercolor animation

Because watercolor art has many similarities with Chinese ink painting, and Chinese audiences have been influenced by ink and watercolor animation, especially for students studying animation, the animation professional education received in China hopes that they will use their own cultural characteristics to create and express, and watercolor art itself is very compatible with animation creation, especially in the early art design stage. Emotional and Psychological Engagement. The emotional design of Chinese animations plays a crucial role in shaping audience engagement. By aligning with the psychological needs of viewers, animations can evoke instinctive, behavioral, and reflective emotional responses. This is achieved through a blend of realism and freehand brushwork, which resonates with the audience's aesthetic experiences and emotional needs (Chen & Khynevych, 2023). Such designs foster a

deeper emotional connection between the audience and the animation, enhancing viewer satisfaction and loyalty. Adding watercolor art is a very effective means to enhance the artistic quality of the picture. In addition, there are many successful cases of ink animation in China, so Chinese students will have a stronger desire to create watercolor digital animation. The development of Thai cinema, particularly the New Thai Cinema movement, indicates a shift towards more diverse and experimental film styles. This openness to new cinematic expressions could extend to animation, including watercolor techniques, if they align with the evolving tastes of Thai audiences (Expósito-Barea & Pérez-Gómez, 2024). The art education received by Thai students is also diverse, but the influence of watercolor or ink art on them is not very profound, and through expert interviews, it is learned that Thai animation artists do not have many practical activities to express watercolor art in animation production. Therefore, Thai students will not immediately have a high degree of trust in digital watercolor animation.

Secondly, existing digital tools struggle with the sophisticated fusion of watercolor techniques, particularly when dealing with multiple scales and local details. This complexity is compounded in 3D animation, where the spatial characteristics of watercolor must be maintained ("Expression and Application of Watercolor Art in Computer 3D Animation Design System", 2022) (Zhang, 2023). The current digital watercolor animation model incorporates the thinking and practical use of AI technology, but the final film does not present AI content, and it has been proved in the creative process that the current AI model cannot temporarily replace manual participation in the creative practice of digital watercolor animation. This also increases the difficulty of using digital watercolor animation, requiring the creative team to have necessary watercolor skills. In summary, more detailed thinking about local cultural expressions should be added to the digital watercolor animation model, whether artistic or technical. At the same time, in the future, we must keep up with the trend of the times, pay attention to the development of AI technology and continue to try to practice, or think about other ways to lower the threshold for the use of digital watercolor animation models. The above methods can enhance Creative interest.

3) Strategies to optimize digital technology application in animation design include enhancing the skills of digital media practitioners and integrating advanced digital tools into the design process. This approach not only improves efficiency but also ensures the sustainability of the animation industry (Liu & Zhang, 2021). Digital watercolor animation production efficiency continues to improve. During the research process of this project, it was found that there is still a lot of room for improvement in improving the combination of watercolor art and digital animation production.

(1) Preprocessing and planning: Before animation production, detailed preprocessing and planning work should be done. This includes script analysis, storyboard drawing, concept art design, etc., to ensure that each step has a clear direction and goal and reduce the time loss of mid-way modification and rework.

(2) Modular animation: The animation is broken down into multiple modules or fragments, produced separately, and then combined. In this way, when multiple people collaborate, different parts can be carried out at the same time, shortening the overall production cycle.

(3) Selection of tools and software: Choose professional software and tools suitable for digital watercolor animation production, such as Adobe Animate, Toon Boom Harmony, TVPaint or Blender, etc. These software provide brushes and tools that simulate watercolor effects, which can speed up the production process.

(4) Feedback and correction: During the animation production process, regular internal review and evaluation are carried out, and necessary adjustments and corrections are made based on feedback to avoid discovering major problems in the later stage, when corrections will be more time-consuming.

(5) Utilizing cloud services: Utilizing cloud storage and cloud computing services not only ensures data security and backup, but also enables efficient resource sharing and collaborative work, thereby improving the efficiency of teamwork.

7.3 Recommendation

7.3.1 For application of research results

1) Animation producers: The animation industry can benefit from the development of digital watercolor animation models by incorporating these techniques into their production processes. This can lead to more visually appealing and imaginative content, potentially attracting a wider audience (Zhang YX, 2023). Animators, directors, producers and other professionals who are directly engaged in animation production. They can use this research to explore new creative methods and improve their technical level.

2) Art designers: Digital watercolor animation can also contribute to the evolution of graphic design by combining traditional art forms with modern digital techniques. This fusion can lead to innovative artistic expressions and new styles in digital illustration (Fu & Feng, 2022). Graphic designers, game designers, advertising creatives, etc. They can combine watercolor art with digital animation and apply it to different design fields.

3) Educators: The integration of digital watercolor techniques into animation education can significantly enhance students' practical skills. Mixed-reality

technology, as explored in digital painting learning models, can be adapted to teach character design and animation, providing a hands-on learning experience that is both engaging and effective (Piankarnka et al., 2023). Teachers and students in art colleges can apply this research in teaching and learning to expand the boundaries of art education.

4) Art lovers: This can lead to more visually appealing and imaginative content, potentially attracting a wider audience (Zhang, 2023). Groups interested in the combination of traditional art and modern technology, who may want to understand and experience different art forms.

5) Technology developers: The use of 3D point cloud reconstruction and neural networks to enhance watercolor effects can provide artists with new tools to create more visually impactful animations. This technology allows for more dynamic and fluid artistic expressions, which can be particularly beneficial in creating animations that require a high level of detail and realism (Zhang YX, 2023). Software engineers, technology R&D teams, etc., who can get inspiration from it and develop new tools and applications.

7.3.2 For future researches

1) Education and training: Mixed-reality technology can be employed to develop practical skills in character design for animation. This involves a structured learning process that includes input data, a digital painting learning process, output assessment, and feedback. Such a model has been evaluated to be highly suitable for teaching character design, providing a comprehensive framework for educators (Piankarnka et al., 2023). Educational institutions can incorporate research results into courses, hold lectures and workshops, and teach the combination of watercolor art and digital animation.

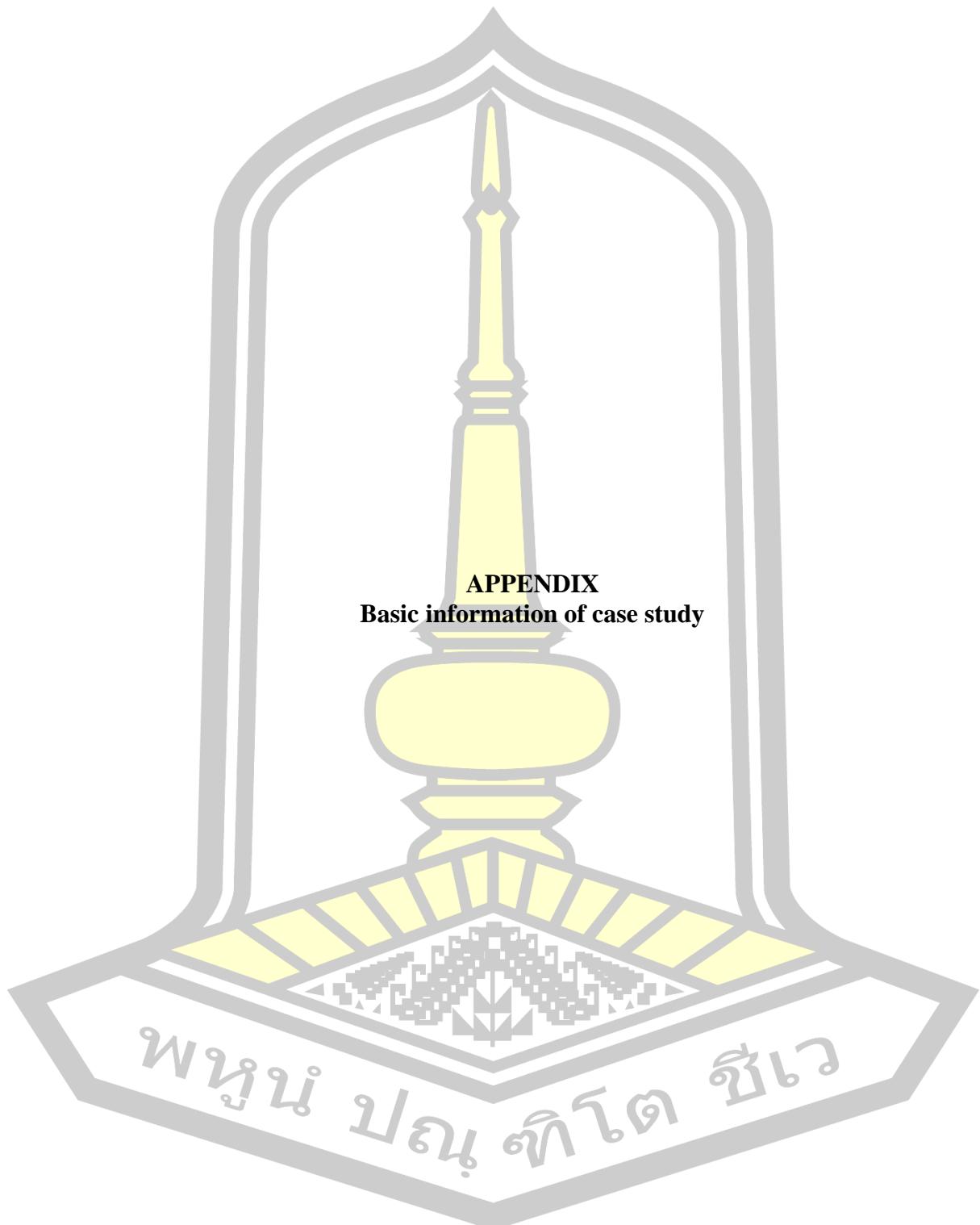
2) Animation production practice: Animation producers can try to apply watercolor techniques to the animation production process based on the research results to create animation works with unique styles.

3) Software development: Advanced image processing techniques, such as the Dual Stream Exception Maximization (DSEM) model, are crucial for automatic watercolor painting. This model uses color space conversion and texture analysis to segment images into meaningful regions, allowing for realistic and expressive watercolor effects. DSEM has shown superior performance in color space estimation and texture analysis compared to conventional techniques (Zhou et al., 2023). Technicians can develop or optimize software tools that support watercolor art simulation and animation production according to the needs of research.

- 4) Cross-border cooperation projects: Artists and technical experts can work together on interdisciplinary projects to explore the possibility of integrating watercolor art with digital technology.
- 5) Academic exchange: Scholars can share this research at academic conferences to promote academic exchanges and knowledge dissemination.
- 6) Artwork creation and display: Artists can use the results of this research to create new works of art and display these works that combine tradition and modernity in exhibitions.
- 7) Commercial application: Advertising companies and marketers can use this new method to create commercial advertisements and promotional materials with unique artistic styles.

These research directions will not only help advance the technology of combining watercolor art with digital animation production, but also deepen our understanding of how this art form affects fields such as visual culture, education, psychology, and business.





1. The animated short film "The Nine-Colored Deer" (1981, China)

1) Expression of the Story Theme

"The Nine-Colored Deer" is adapted from a jataka tale in Buddhism. Two widely circulated versions of the story are the translation by Zhi Qian during the Three Kingdoms period, titled "The Buddha Speaks the Sutra of the Nine-Colored Deer," and the story "The Origin of the Deer King" from the "Collection of Six Perfections Sutras" translated by Kang Senghui, also from the Three Kingdoms period. The plot of the animated film primarily follows Zhi Qian's translation:

Long ago, a Bodhisattva transformed into a nine-colored deer with fur of nine hues and snow-white horns, grazing by the banks of the Ganges River, and befriended a bird. One day, a drowning man was swept downstream, and the nine-colored deer rescued him. After the man was saved, he circled the deer three times and bowed, hoping to become its servant to repay the kindness. However, the deer asked him to leave and warned him not to reveal its whereabouts, as humans covet its fur and horns, which could bring harm. The man promised and departed.

Soon after, the queen dreamed of a nine-colored deer. She longed for cushions made of deer skin and dusters made of deer horns. Therefore, the king offered a reward of gold and silver to find this deer. A previous drowning victim, driven by greed, betrayed the hiding place of the nine-colored deer to the king, and as a result, his face immediately became covered in scars. The king and his men went to the bank of the Ganges and saw the nine-colored deer. The attendants raised their arrows to shoot. The nine-colored deer recounted the story of saving the drowning man, indicating that it had helped without seeking reward, just like people would not repeatedly use floating wood. The king felt deeply ashamed after hearing this and reproached the drowning man for his ingratitude. He then immediately ordered that severe punishment be imposed on anyone who harmed the nine-colored deer in the future. From then on, the nine-colored deer lived harmoniously with the people and eventually disappeared from their sight.

The literary script of this animation was created by Dunhuang studies expert Pan Jiezi in 1955 at the invitation of the Shanghai Animation Film Studio. When the project was restarted, director Qian Jiajun, taking into account the social background of the 1980s, reduced the element of karmic retribution and emphasized the spirit of the nine-colored deer's willingness to help and boundless love, praising its noble character. To achieve this, the following changes were made:

A scene was added where the nine-colored deer rescues a Persian caravan during a sandstorm, demonstrating its care for surrounding life. Its maternal image was reinforced by small animals mistakenly calling the nine-colored deer "mom." The

identity of the drowning victim was set as a snake catcher, making it more fitting for the scene where he falls into the water while catching snakes in the forest and is rescued by the nine-colored deer, a plot not mentioned in the original. The friend of the nine-colored deer, not mentioned in the original, was changed to a yellow warbler in the animated film to avoid negative associations with crows in Chinese culture. The posture of the nine-colored deer facing the king was adjusted to resemble Dunhuang murals, with the nine-colored deer appearing in a standing position to show its dignity. A scene was added where the nine-colored deer knowingly chooses to rescue despite the danger, emphasizing its selflessness. This spirit moved the king and his soldiers, arousing anger towards the greedy and shameless behavior of the snake catcher.

2) Preliminary Art Design

"Nine-Colored Deer" is not only an outstanding animated work that integrates poetic and mysterious colors but also holds a unique position in the history of animation by focusing on Dunhuang at an early stage, introducing the pearl of this national cultural heritage — Dunhuang murals — to the world. Whether it was Qian Jiajun's conception and creation of "Nine-Colored Deer" in the 1950s or the realization of this wish in the 1980s, the Dunhuang murals, as a shining gem in the Dunhuang treasury, were still relatively unfamiliar to the public. Therefore, the film deliberately added two scenes depicting the Dunhuang grottoes at the beginning and end, starting and ending the entire film with Dunhuang, strengthening the audience's impression of Dunhuang.

Specifically, the character design and color usage in "Nine-Colored Deer" fully reflect the artistic style of Dunhuang, with motion design being both graceful and rhythmic. Apart from the distinctive characteristics and elegant movements of the nine-colored deer mentioned earlier, the design of the background is also carefully considered, reflecting the team's efforts to refine and integrate the results of on-site research and imitation into the images, with innovations made on this basis. For example, the film draws inspiration from the landscape of Cave 257 in Dunhuang, adopting the characteristics of Wei and Jin dynasty landscape painting. The design of mountains and trees imitates the style and composition of Dunhuang murals, presenting the rugged style of the Northern Wei dynasty. In the scenes depicting the nine-colored deer running, the surrounding mountains serve not only as references for spatial movement but also as boundaries for scene transitions, cleverly using the mountains and rivers as story dividers, as seen in murals.

The proportions between characters and mountains in the film also draw inspiration from the murals. In the murals, we often see "water not accommodating boats, people larger than mountains," and similarly, the characters and mountains in

the film often present similar proportional relationships, especially in scenes where the nine-colored deer appears alone, typically showing the "deer larger than the mountain," highlighting the divine nature of the nine-colored deer. Due to the distinctive features of mountains and scenery, Feng Jiannan found it difficult to depict the imperial city. During his study of Dunhuang, Feng Jiannan struggled with this issue, but inspiration struck him as he passed through Jiayuguan on his return journey.

One particularly noteworthy scene involves the king leading his army into the forest. Various animals attached to the mountain originally symbolized their concealment within the forest. As the army approaches, these animals suddenly leap off the mountainside and scatter in all directions. This clever design not only responds to the syncretism of figure and landscape in Dunhuang murals but also effectively showcases the animation's distinctive features.



Figure 61 Stills from *Nine-Colored Deer* (2)
Source: The Movie Database

The animated film "The Nine-Colored Deer" presents a total of eleven meticulously designed scenes, far exceeding the number of scenes in the Dunhuang mural "The Deer King Jataka". The designers deeply understood, absorbed, and transformed the styles of Tang dynasty scroll paintings and Dunhuang murals. They employed traditional line drawing techniques to outline the basic contours of the scenes and used heavy coloring to render elements such as mountains, vegetation, city walls, buildings, and furniture, both indoors and outdoors. The rich and vibrant colors fully reflect the historical background of the story, while the rich flavor of the Western Regions adds to the enchanting atmosphere of the narrative.

3) Expression of Watercolor Language

Furthermore, the most iconic feature of the film, the fur pattern of the nine-colored deer, is treated differently from Dunhuang murals. The production team simplified it into several crescent-shaped color blocks, not limited to "nine" colors. This not only makes it easier to animate but also makes the characteristics more distinct. This classic design still has a wide influence today, as almost all images of the nine-colored deer are influenced by it. Feng Jiannan admitted that the nine-colored deer design in his later comic book "The Nine-Colored Deer" was also adjusted and modified based on this. In the opening scene of the work, when depicting the Silk Road, the production team chose rougher Korean paper and used techniques such as outlining, rubbing, and dotting to create a natural play of light and shadow and a mottled texture, showing casing the unique texture of paper painting. Such choices reflect the designers' meticulous consideration of material selection.

Ancient China had a wide variety of papers, mainly made from various plant fibers such as bamboo, wood, cotton, and hemp. Due to the differences in the fineness of these fibers and the production processes, each type of paper has different colors, gloss, and delicacy, resulting in unique texture effects when used for watercolor painting. Considering that "The Nine-Colored Deer" is inspired by the Dunhuang mural "The Deer King Jataka", and especially since the story's setting is on the Silk Road, a paper with a heavy and rough texture is needed as the base for the image to realistically reproduce the natural scenery of the Western Regions. Therefore, the designers chose to paint on Korean paper with a thick texture rather than smoother and finer rice paper, which was very appropriate. When producing animated films with traditional themes and styles, contemporary creators should also choose paper textures that best reflect the cultural atmosphere of the scenes.

Furthermore, in the scene design of coloring watercolor animated films, the emphasis on selecting appropriate paper textures is also because it can bring a profound sense of detachment from reality to the distant views in scene depiction. In the process of animation, this heightened sense of Illusion portrayed by scene depiction provides audiences with deeper story immersion and identification experiences, with a strong narrative psychological implication. Although animation is a dynamic visual form, it effectively conveys the historical depth of the images through the combination of paper texture and color painting, allowing the audience to feel as if the story originates from a certain record in the river of history, thereby triggering resonances with the audience's deep cultural memories.

To craft scenes for watercolor animation, it is crucial to deeply understand the modeling and coloring techniques of traditional Chinese painting. Using ink to outline forms and layering colors to depict physical appearances are key methods. Although

excellent scene design for watercolor animation falls within the realm of dynamic visual arts, its creative process shares many similarities with painting, particularly in designing keyframes and creating atmosphere. Many scenes in static visual arts, relying on camera movement to convey a sense of time and dynamics, resemble watercolor paintings and are considered static visual arts. Designers need to utilize perspective, solidity, elevation, as well as contrast in color saturation and thickness on the canvas to convey a sense of space and time flow within the scene.

The fundamental rules of composition and coloring are ingeniously applied in the scene design of "Jiuse Lu". Designers interpret the Dunhuang mural style, absorbing basic composition, modeling, and coloring elements, and combined Western oil painting perspective and color techniques to modernize the planar and patterned decorative techniques of Dunhuang murals. This emphasizes the sense of depth in distant and nearby objects, presenting a work that not only embodies the charm of traditional heavy-color watercolor but also conforms to modern aesthetic styles.

In watercolor painting, the use of color is not limited to the light source of objects and warm or cool tones but emphasizes the depiction of inherent colors and pursues symbolic and imagistic expression of psychological feelings. This subjective use of color aligns with the pursuit of unique styles in animation scene design. In watercolor animation production, "color" as a subjective means of color expression greatly promotes the creation of animated imagery. The profound cultural heritage gives the Chinese people a unique understanding of color, often using harmonious color rhythms and rhythms to create atmosphere. Whether it's outlining or coloring, Chinese painting can achieve subjective representations of objective images through the use of brush and ink. Mastering techniques such as different brushstrokes, strokes, twists and turns, and hooking enhances the distinctive cultural temperament of Chinese painting and profoundly influences the overall style of animated films.

Animation art pursues not realistic reproduction of reality but high virtuality. Its style and expression require a refined and unified visual style, achieving a perfect blend of reality and virtuality for viewers' visual enjoyment.

Taking the desert storm scene in "Jiuse Lu" as an example, as the camera enters, the sky appears gray-blue, and the colors of sand dunes and mountains become darker. Then, the changes in weather are depicted with light ink in the sky, creating a sense of impending heavy rain as the camera moves, conveying a sense of oppression. This precise capture of the instant changes in natural landscapes benefits from the clever arrangement of form, line, and color, vividly restoring rich emotional memories.

Though not realistic, it is highly vivid and concise, achieving artistic effects that touch the heart through emotions.

For example, in describing the habitat of the Nine-Colored Deer, the increased brightness and saturation of the colors highlight the positive reinforcement of goodness and beauty in the film. When depicting the exterior scenes of cities and palaces, designers use a large amount of red to depict the prosperity and wealth of the city walls, in sharp contrast to the desolation of the desert, marking the shift of narrative focus. When depicting the interior of the palace where the king and queen are discussing at night, the scene uses many decorative elements from Dunhuang murals, employing deep black, stone blue, stone green, and ochre colors on walls, screens, and curtains. These rich colors not only match the palace environment but also reflect the characters' inner melancholy in relatively dim brightness.

In summary, the application of this subjective color expression technique effectively promotes the theme of good versus evil and the pursuit of light and freedom in "Jiuse Lu", as well as the presentation of visual vividness and reality in animation films.

In animated films, the integration of static and dynamic scene elements is crucial for driving narrative and enhancing visual vividness. Dynamism, as an active factor in presenting environmental clues and advancing the plot, creates vivid, real, and vivid visual experiences through the combination of static and dynamic visual effects, multi-layered image overlays, and perspective shifting techniques. The excellence of scene design in watercolor animation lies in its ability to utilize lively brushstrokes and versatile color rendering to create an endless visual feast with simple techniques. This is fully demonstrated in the snowstorm scene in "Jiuse Lu": designers use rough circular ink lines to depict tornadoes and, in the foreground, use rapidly moving lines and faint yellow and white lines to successfully capture and present the winds and rains before the snowstorm. When showing the Nine-Colored Deer roaming in the natural environment, designers cleverly divide the colorful flowers, trees, and grass into distant, middle, and near views. As the deer moves, the dynamic elements of the foreground and background landscapes interweave and gradually separate, bringing about delightful visual changes. As for the scene where the snake charmer ultimately drowns, the use of dynamic color blocks and lines in light blue on the water's surface, combined with the struggling figures, conveys the characters' inner fear and panic. This concise and vivid design of dynamic scene elements is a classic work in the field of watercolor animation.

2 The animated short film "Monk and the Fish" (1994, France)

1) Expression of the Story Theme

The core characters of this work are the little monk and the fish, between whom many contradictions and conflicts exist. From a biological perspective, fish are food that people rely on for survival, and catching fish is for consumption. However, Buddhist teachings are centered on compassion and wisdom, with refraining from killing being the greatest compassion. Buddhism is entrusted with the salvation of sentient beings' lives, so monks cannot kill, nor can they eat meat. This raises endless imaginations and reflections from the audience on why the monk would catch fish. From a sociological perspective, the prolific nature of fish is endowed with the symbolic meaning of life and reproduction by people. Many countries associate fish with femininity or the feminine. Buddhism holds that monks bear the significant responsibility of upholding the Dharma and continuing the wisdom of Buddha's life. Therefore, they must remain celibate to achieve this. One of the most basic precepts of Buddhism is refraining from killing, which contradicts the content portrayed in the film.

Humans are highly social animals with thoughts and emotions. In real life, no one can resist the temptations of the material world. In this work, the fish represents desire, which may be secular material desire or spiritual freedom. The monks' strict rules and regulations torment them with worldly troubles, while they pursue a free life and ultimately abandon the material for spiritual enlightenment. In the final part of the film, after the fish swims out of the room and becomes calm, it starts swimming in the air. At this point, the little monk no longer catches fish but watches the fish quietly, gradually making way for the fish to enter a void world and soar together. The harmony between the little monk and the flying fish gradually fades away. From these scenes, it can be seen that catching fish is not for eating fish; these scenes represent the monk's spiritual liberation.

If one truly understands life, they can understand the philosophical meaning of the film. Monks, like ordinary people, also yearn for a free life. The monk's fishing is a kind of persistence, and persistence is also a kind of enlightenment. This paradox of prohibition and escape endows the film with a certain philosophical meaning.

2) Expression of Watercolor Language

After meticulously studying animated films with watercolor effects such as "The Monk and the Fish" and personally practicing the production process, the author has identified the bottleneck of 2D animation techniques in achieving watercolor effects and believes that a solution can be found in animation art design. Scene design in art design is the main way to express the visual style of animated films, and the realization of watercolor effects in animated films should pay attention to scene design. From the perspective of the animation production itself, mastering the edges

of scenery and characters is the key to solving all problems. Breaking through these difficulties and key points step by step in the animation production process can find methods to integrate watercolor into animation at this stage and strive to balance animation quality and cost. By analyzing the animated short film "The Monk and the Fish" with watercolor effects, effective means of integrating watercolor into animation are explored in terms of art design, animation production techniques, etc., and a balance is found between the quality of the animated film, the scope of technical application, and production costs.

Firstly, watercolor painting stands out among various art forms for its fresh and elegant, lively and light visual effects, making it particularly suitable for depicting themes that are both fresh and elegant, or radiant and subtle. However, translating these qualities of watercolor into animated scenes poses significant technical challenges. Elements such as watermarks, color gradients, the intertwining patterns formed by pigment blending, the color changes produced by overlapping color blocks, and the traces left by color flow are key factors in forming the unique style of watercolor. However, in animation production, these elements become formidable obstacles to overcome.

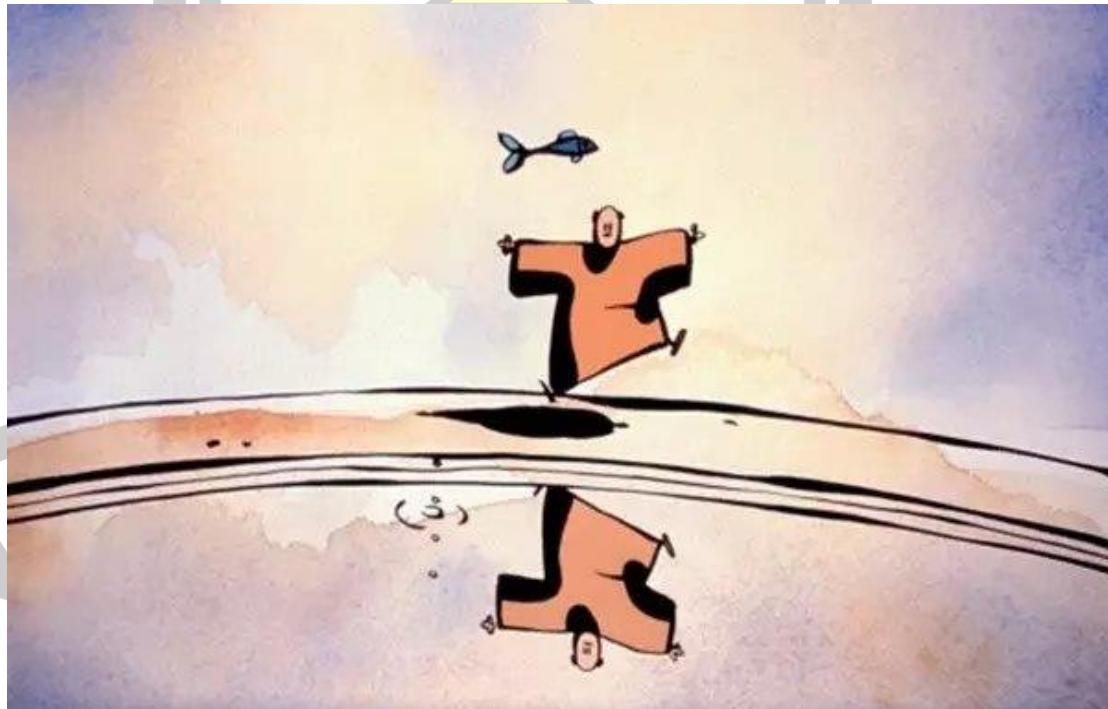


Figure 62 Stills from *Monk and the Fish* (2)
Source: The Movie Database

There are few works that truly embody the charm of watercolor in animated scenes, with "Monk and Fish" being one of them. This is an animation created with

the watercolor effect of celluloid, featuring fresh and lively visuals, full and varied colors, strong summarization, and a rich watercolor flavor. The scenes of "Monk and Fish" are simplified into two color tones: blue and yellow. These two tones achieve color contrast and the coolness, brightness, darkness, and reality of the scene. These colors permeate and blend in the scene, forming a highly varied watercolor flavor. The background buildings outlined with sepia lines are refined and summarized, making the entire scene appear ethereal and abstract, with a strong romanticism. The lighting and shadow in the scenes are broadly summarized, with shadows being entirely painted with sepia, merging with the lines, further enhancing the shape of the background buildings and the form of the scene. Additionally, the scene design discards distant objects, retaining only nearby ones, making the scene concise and focused, strengthening its form. However, such scene designs are only suitable for conceptually strong and short-length animation works; they are not suitable for longer or more realistic-themed animation works. The character design also uses sepia lines for outlining, with highlights in monochrome and shadows in sepia, merging with the contours to create a cut-out effect, matching the background's styling, achieving unity between characters and scenery. Such character design has strict shapes and contour lines, allowing precise control over the colors, shapes, and positions of single-frame images, ensuring the stability and fluency of animation scenes. However, the extensive use of dark colors in character design creates silhouettes lacking in detail, making it unsuitable for shots that need to express character expression details, such as mid-shots, close-ups, etc., thus unsuitable for realistic-themed and longer-length animation works. "Monk and Fish" has many unique aspects in art design, and its refinement and summarization of watercolor painting techniques are valuable. Still, it falls short in depicting realistic themes and some more delicate and complex plot elements. Nevertheless, "Monk and Fish" provides us with an important insight—overcoming obstacles in animation creation is not solely about technical solutions; deficiencies in technology can be compensated for in design.

In watercolor painting creation, there are various techniques and types of lines. In some watercolor paintings, especially watercolor illustrations, the use of lines is very common. These lines are primarily sepia, varying in temperature and intensity, harmonizing with the tone of the picture. The drawing technique is casual, not bound by a specific style, determined by the style of the picture, and the lines are integrated into the picture, merging with the form. The use of lines in "Monk and Fish" is similar to the common techniques used in watercolor illustrations and sketches. Predominantly sepia, the lines are lively and varied, with the color of the lines unified into a single color without variations in intensity. The dark parts of the scenery and

characters are also flatly painted with the same color as the lines, blending with the lines to form a cut-out style. With clear edges and uniform colors, the layering and cutting of the background and the problems faced by the original animation of the characters can be effectively solved. Moreover, lines of the same color can also coordinate the painting style of the background and characters in the picture. Although the handling of lines and dark parts in "Monk and Fish" creates a strong sense of form and a unique style, there are still some limitations in the representation of works with realistic themes, and the handling techniques need further improvement. Therefore, based on considerations of the theme, visual style, and production techniques of the work, adjustments can be made to the handling of lines and colors.



Figure 63 Stills from *Monk and the Fish* (3)
Source: The Movie Database

3) Preliminary Art Design

This film also showcases the unique charm of watercolors throughout. Art design is the stage where the visual art style of the animation is determined, and the watercolor style of the animation will be established in the art design phase. Animation art design includes scene design and character design. Among them, scene design plays a crucial role in expressing the animation's artistic style, determining the direction of the animation's visual art style. Therefore, focusing on watercolor effects in scene design is an effective approach.

Making the background part of the animation scene the primary platform for expressing the watercolor style, creating richly flavored watercolor background scenes, and influencing the entire animation's watercolor style. This approach enables the drawing and synthesis of backgrounds to achieve watercolor effects without requiring special technical processing, ensuring that production processes and costs are not affected. However, this method is only suitable for single-layer background drawing; it is not suitable for backgrounds that require layered drawing. Because objects painted with watercolors have few clear and strict outline edges, it is difficult to determine the cutting edges during cropping and scene segmentation, and it is easy to encounter residual white edges from foreground objects, affecting the quality of the image. Therefore, edge lines are a key point in achieving watercolor effects in animation. If this problem can be solved, other issues can be easily resolved. This is also true for character design. With clear and strict outline edges for characters, the original animation drawing can proceed smoothly, and the stability and fluency of the images can be guaranteed. Therefore, finding lines that do not affect the expression of watercolor effects while clearly defining the outlines of objects and characters becomes crucial.

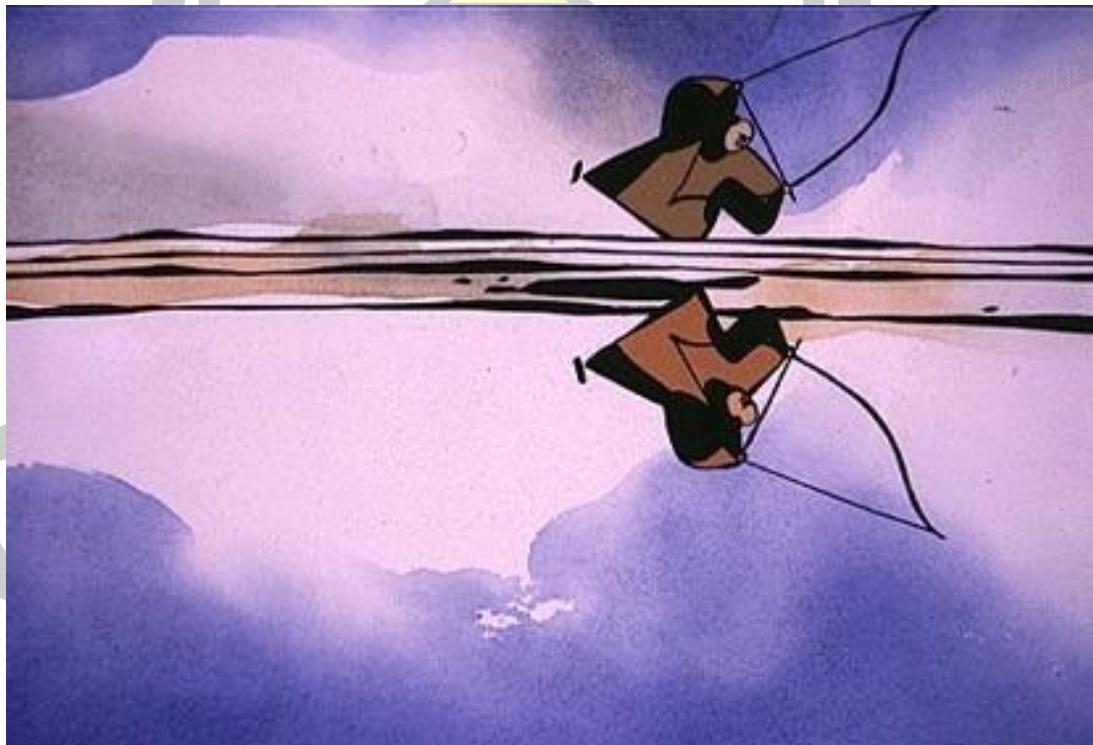


Figure 64 Stills from *Monk and the Fish* (4)
Source: The Movie Database

4) Animation Production

Since the birth of animation, the dominant technique has been single-line flat painting. With the advancement of technology and the emergence of new materials and techniques, especially with the intervention of computer media, the scope of animation expression has been greatly expanded. However, regardless of how animation forms evolve, hand-drawn animation always exudes infinite artistic charm and embodies the essential characteristics of animation techniques. In animation creation, if the differences between consecutive frames are minimal, the animation's images will be more stable, and the playback will be smoother. Conversely, significant differences in visual elements such as position, shape, size, color, and brightness between consecutive frames may cause jitter or flickering during playback, which not only affects the smoothness of the animation but also may impact the audience's viewing experience. Therefore, there seems to be an irreconcilable contradiction between animation techniques and the uncertain characteristics of watercolor.

5) Music Accompaniment

The soundtrack of the animated short film "Monk and the Fish" was adapted by the renowned French composer Semwge Basset from the ancient Portuguese tune "la follia", which has been interpreted by many famous musicians such as Antonio Vivaldi, Corelli, Bach, and Rachmaninoff in different versions. In order to achieve a perfect combination of image and sound, Michael Dudok de Wit collaborated closely with Semwge Basset. They not only deeply integrated the animation with the music but also adjusted the story and melody to ensure harmony and unity. Michael adjusted certain plot points according to the music, while Semwge also fine-tuned the music rhythm according to the needs of the animation. After months of careful cooperation, the film's music and animation complement each other, achieving an admirable artistic realm.

The entire film does not use any dialogue and relies entirely on the harmony between the images and the music to tell the story. The combination of music and character actions is extremely close. As the actions change, the music presents different rises and falls and emotional transitions, like the natural flow of clouds and water, natural yet refreshing. The rhythm changes of the music correspond to the characters' inner activities, expressing joy, loss, anger, or ultimate tranquility through the ups and downs of the music.

3 The animated film "The Tale of Princess Kaguya"(2013, Japan)

1) Expression of the Story Theme

The film tells the story of a Japanese folklore tale from the early tenth century, "The Tale of the Bamboo Cutter." The main plot of the story is as follows: an old man who cuts bamboo for a living discovers a peculiar bamboo shoot while cutting bamboo. When he brings it home, he finds it is a small girl. Subsequently, the old man brings Princess Kaguya to the bustling city, teaches her various skills, and hopes she will become a true princess. However, when Princess Kaguya grows into an adult, those who come to propose to her do not genuinely love her; even the emperor is attracted to her beauty. Unable to bear all of this, Princess Kaguya ultimately transforms into a celestial being. The gods in heaven question Princess Kaguya if she feels the ugliness of the human world, but after thinking, she denies them. She affirms the beauty of the human world, believing that everything in the human world is worthy of praise. It is then that people realize Princess Kaguya is actually a celestial being from the moon. The film downplays Princess Kaguya's image as a celestial being, shaping her as a flesh-and-blood, naive, and kind-hearted girl. At the same time, the film's exploration of human life also provokes audience contemplation.

Mr. Hayao Miyazaki's aesthetic pursuit is not limited to the colors and layout of the film. This film can also be seen as a movie for adult audiences because it stimulates deep reflection on the essence of life. A film that stimulates deep thought is far more valuable than superficial works. "The Tale of Princess Kaguya" is indeed exploring life issues. Mr. Hayao Miyazaki is not only dedicated to making excellent animated films but also concerned with social issues. This film not only explores Princess Kaguya's personal life but also raises fundamental questions about humanity and divinity through her identity as a celestial being. Unlike the views of many gods, Princess Kaguya is punished by the gods of the moon because she insists on praising the human world. Therefore, the entire plot also discusses Princess Kaguya's crimes and punishment.

In the film, it is mentioned that Princess Kaguya knows the children's rhymes of the human world and sings another version. At the end of the film, this mystery is solved: there was once a fairy on the moon who was punished. It seems that Princess Kaguya may have heard various stories from that fairy and then had the idea to descend to the human world. The residents of the moon tried to make Princess Kaguya descend to experience the pain of the human world, to eliminate her attachment and longing for the human world. However, it is precisely her longing for the human world and her difficult-to-sever emotions that constitute Princess Kaguya's greatest crime. As residents of the moon, expecting something from the human world is Princess Kaguya's crime.



Figure 65 Stills from *The Tale of Princess Kaguya* (2)
Source: The Movie Database

At the end of the film, we can see that a celestial being on the moon is depicted in the image of Shakyamuni, while other celestial beings stand on either side with vacant eyes. These celestial beings are beings who have transcended the suffering of the human world. In their eyes, human emotions are ridiculous and should not exist. They cannot understand Princess Kaguya's attachment to the human world or her adoptive parents' reluctance to let her go. Therefore, as a princess of the moon, Princess Kaguya must not have any attachment to the human world. It is precisely because of this that Princess Kaguya becomes an anomaly on the moon. To "enlighten" her about the dirtiness of the human world, she is sent to suffer in the human world, which is her punishment. The celestial beings make Princess Kaguya

come to the human world to experience the harassment of mortals, to change her view of the human world, and to force her to submit to the celestial beings' ideology.

3) Expression of Watercolor Language

The aesthetic of animation in "The Tale of Princess Kaguya" primarily manifests in its color palette and drawing technique. It is widely acknowledged that "The Tale of Princess Kaguya" employs hand-drawn animation, characterized by sharp, vivid imagery and unique color schemes reminiscent of traditional landscape paintings. The advantage of hand-drawn animation lies in its ability to better reflect the characters' personalities. For instance, the rugged, unrestrained, and wild personalities of characters add flesh and blood to Princess Kaguya. This is particularly evident when Kaguya eagerly flees the mundane world during the naming ceremony hosted by the old man, running into the mountains and forests. The advantage of hand-drawn animation becomes apparent here, as the expressive and coarse lines dynamically change with Kaguya's running, vividly portraying her inner desires, compared to the rigid lines of computer-generated animation. Additionally, the overall color tone of the film is worth exploring. It offers a comfortable and pleasant feeling throughout. At the beginning of the film, Kaguya is born in the mountains and grows up as an innocent girl. The entire film's tone seems to immerse viewers in the mountains and forests, with fresh and elegant colors, resembling a landscape painting brought to life on the screen. Isao Takahata also designed many novel details to create the atmosphere of landscape painting. One of these elements is the folk songs that frequently appear in the film. These folk songs depict the tranquility of nature and also express the helplessness of humanity. While nursery rhymes are sung by everyone, Kaguya has her own version. The beginning of the film sets up Kaguya's uniqueness, laying the groundwork for revealing her true identity later on.

Figure 66 Stills from *The Tale of Princess Kaguya* (3)

Source: The Movie Database

"The Tale of Princess Kaguya" innovates in the field of animation production. The entire film's visuals are hand-drawn, using subtle watercolor tones and delicate background sketches, combined with sketch-style lines, showcasing the harmonious unity between watercolor and brushstrokes. The film draws inspiration from classical Japanese painting techniques, presenting landscapes in the style of ink wash painting, enriching the animation's expressive power and adding symbolic meaning, making every frame resemble a thought-provoking work of art. Additionally, the film combines the blank space artistry of Japanese ink painting with the imagery of

Chinese ink painting, showcasing its rich aesthetic connotations and exquisite production techniques.

During the early development of Japanese watercolor painting, cultural exchanges between China and Japan profoundly influenced their painting arts, which deeply penetrated into the veins of Japanese Zen painting. Zen painters actively absorbed and learned from the essence of Chinese Song dynasty landscape painting. Under the influence of Japanese native culture, they gradually formed their own national art system. Japanese ink wash painting reflects the cultural background and humanistic cultivation of its nation, integrating with Zen Buddhist ideology, presenting a visual beauty through abstract techniques, and expressing thematic contemplation through spatial application, full of the cultural characteristics of life experience and exploration of nature. The connotation of Japanese ink wash culture continues to this day. With the progress and development of the times, it is continuously inherited and developed, integrating into film and television works, reflecting the aesthetic pursuit of perfect imagery. Under the careful direction of Isao Takahata, with the support of a professional production team, "The Tale of Princess Kaguya" is created as a beautiful and breathtaking Japanese ink wash film full of Zen aesthetic and artistic connotations. The Japanese ink wash painting in the film presents an overall misty feeling, abandoning bright colors, and using simple watercolor washes on the screen, emphasizing the use of colors of the objects themselves, maintaining purity and avoiding mixtures, which is significantly different from the past imitation of realistic watercolor styles. The combination of crayons and ink is used to depict the overall environment, and the simple and elegant watercolor is used to represent the lush natural colors of the landscape. The extensive use of intermediate tones reduces the saturation and brightness of the images, creating a soft viewing atmosphere with a "dull tone" color system. In terms of painting techniques, the sketch-like simplicity is delicate and quaint, vividly depicting the barren life in the mountains, making the impoverished life colorful. The flowing streams, lively birds and insects, and wildflowers are all vividly portrayed using ink wash painting techniques, depicting rural landscapes as a source of free growth, with the misty characteristics of the lens presenting a hazy beauty. The value of ink wash painting lies in embodying the essence of things with minimal elements. The film's scenic artist, Manabu Ohashi, stated that in order to create a sense of overgrown weeds in the film, transparent watercolors were used throughout the painting process instead of conventional pigments. Lines were drawn with pencils and then colored with light washes, giving the images a lightness characteristic, replacing addition with subtraction.

The application of Chinese ink wash painting typically focuses on elements such as landscapes, plants, and animals. This evocative art form originated in the Song and Yuan dynasties, exerting a profound influence on Japanese painting. Compared to traditional Chinese ink wash painting, Japanese watercolor painting embodies different aesthetic concepts, often imbuing Zen sentiments and exuding a serene and modest beauty. The composition emphasizes blank spaces, and the gradation of ink is just right, creating a profound and enchanting visual effect. When depicting natural landscapes, Japanese watercolor painting emphasizes the use of lines to outline various natural forms of water, highlighting the changes in ink, and focusing on expressing Zen Buddhist sentiments.

In this work, the portrayal of flowers, plants, and trees mainly serves to present the living environment of the protagonist, Old Bamboo Man. As the seasons change, the young girl, Princess Kaguya, grows up surrounded by nature, encountering a variety of flora and fauna. Japanese animation directors excel at using various flowers as elements for scene transitions or as metaphors and symbols. For example, blue gentians, elegant wisterias, golden rapeseed flowers, and dazzling cherry blossoms, presented in the style of ink wash painting, exhibit a unique aesthetic.



Figure 67 Stills from *The Tale of Princess Kaguya* (4)
Source: The Movie Database

3) Preliminary Art Design

The character of Princess Kaguya draws essence from the princess archetype of Studio Ghibli, appearing as a beautiful young girl born from a bamboo shoot. She

wears luxurious clothing, with a charming and captivating appearance, growing rapidly and unconstrained by societal norms. Princess Kaguya is portrayed as fresh, extraordinary, wise, and stunning, with lively and expressive eyes, resembling the brightness of the moon in the sky. The film's drawing technique primarily uses a large number of sketch-like lines to flexibly depict close-ups of characters' faces, simplifying the hierarchy of objects. These lines are powerful, directing the audience's attention to the characters' expressions and demeanor. "The Tale of Princess Kaguya" does not aim for realism in its animated scenery but rather adopts the expressive characteristics of ink wash painting, which allows the scenes to convey both landscapes and metaphorical meanings.

In the film's ink wash style, the characters' deification is not overly emphasized. In the early narrative, the mythological aspect of the female protagonist is toned down, making her appear more realistic and full-bodied, vivid and moving. Although both the characters and the background are depicted in a one-dimensional space, the flexible use of ink wash lines successfully outlines the characters' physical features, creating a sense of dimensionality and displaying multiple states. In ink wash painting, the effects of delineation vary with the depth of the lines; deep lines help convey a sense of reality, while lighter lines are more suitable for depicting the characters' deification traits. When depicting scenes of Kaguya and the boy playing together, the ink wash lines are soft and free-flowing. They roam between heaven and earth, with a backdrop of lightly rendered landscapes, moonlight shining faintly, outlining their graceful figures.

Before the main character, Princess Kaguya, is taken away by the Moon Kingdom, the lines in the scene are rough and heavy, reflecting her true state in the human world. However, when the vast and mysterious celestial band enters the scene, the delineation of the characters in the fairyland tends to be lighter, helping to differentiate between different worlds and characters. The atmosphere of the ink wash painting is lively and vivid, the brushwork is unrestrained, and the characters' flying and drifting freedom is vividly portrayed. This not only presents the characteristic of "emptiness" in Zen but also renders the characters as if in a dream. The blurry and restrained color atmosphere echoes the quiet and profound worldview of Zen, making one's inner world peaceful and tranquil, transcending the material world.

The film fully utilizes the expressiveness of lines and colors to convey the cuteness of babies, the abundance of food, and the touching aspects of family love through rounded lines. Ink wash painting, with its strong imagery and pursuit of aesthetic sentiments, possesses unique charm in expressing emotions. Old Bamboo Man and his wife's deep love for Princess Kaguya is depicted through slightly plump

figures, evoking a sense of warmth. Furthermore, the technique of bold ink and heavy color in ink wash painting can keenly capture and portray the characters' psychological changes. In the film, Princess Kaguya experiences two intense emotional fluctuations. The first is during the banquet when Old Bamboo Man invites high-ranking officials and dignitaries. Kaguya can only hide behind the curtains, witnessing the guests indulging in revelry, singing loudly, treating her as a topic of conversation to compare and pursue, which makes Kaguya feel uneasy and agitated. She longs to escape the superficial and mundane chatter of the banquet and dreams of angrily rushing out of the mansion to the countryside. At this moment, the style of painting is exceptionally rough, the brushstrokes are rapid, symbolizing the urgency of the princess's escape and her yearning for the countryside.



Figure 68 Stills from *The Tale of Princess Kaguya* (5)
Source: The Movie Database

When depicting the scene of Princess Kaguya's frantic escape, the film adopts an intense and fervent approach, delivering a stunning visual impact to the audience. The artistic style here is particularly free, characterized by the ink-wash style reminiscent of Huang BinHong. The distortion and twisting of characters, flowers, trees, and the moon not only serve a metaphorical function but also exude rich expressive effects, highlighting Princess Kaguya's inner anxiety and frenzy. The sketch-like overlapping lines enable the film to delve deeper into the characters' inner emotions. For Princess Kaguya's facial expressions, the creators also altered the artistic style, employing asymmetrical facial lines to express her inner resistance with

a sense of arbitrariness, profoundly portraying her anger and worry. As the camera follows Princess Kaguya's footsteps, the audience finds it easier to empathize.

In summary, Isao Takahata's use of scroll-like lines to depict characters' inner emotions in "The Tale of the Princess Kaguya" mainly manifests in two aspects: firstly, the variation in line thickness reflects the characters' emotional changes. For instance, when Princess Kaguya roams freely, the lines are delicate and smooth, depicting a carefree state and a joyful mood. However, when she flees in anger, the lines become rough, heavy, and twisted, conveying her anger and sadness. Secondly, the changes in lines also affect the characters' facial expressions. For example, Princess Kaguya's features collapse and deform under anger and sadness, highlighting the intense expression of her inner emotions. This scroll-like line portrayal makes the characters' emotions more palpable, offering a visual experience different from traditional animation. The character designs in "The Tale of the Princess Kaguya" reflect the exaggeration characteristic of scroll paintings. Firstly, Princess Kaguya's proportions are harmonious, with delicate and exquisite lines, vivid expressions, showcasing the scroll painting's delicate and concise characteristics. Yet, her facial features are exaggerated, emphasizing the pursuit of profound aesthetics in Eastern culture. Secondly, when Princess Kaguya and Sutemaru roam between heaven and earth, the lines are delicate and smooth, conveying their graceful state and cheerful mood. However, when Princess Kaguya flees in anger, the lines become rough, heavy, and twisted, with her features collapsing and deforming, highlighting her anger and sadness. Additionally, the figure of Minister of the Right Abe, chubby and round like a ball, with thick white powder on his face, his deceptive and cunning characteristics are highlighted through exaggerated styling, revealing his personality. These exaggerated characteristics of character design not only reflect the influence of scroll paintings but also cater to the aesthetic demands of modern audiences, making the characters more attractive and increasing audience resonance and acceptance.

Watercolor painting pays great attention to composition, lacking the shadows and perspectives found in Western paintings, and instead, uses a lot of blank space to depict changes in scenery from palaces to forests. The film uses a combination of ink and turbid colors, with dense ink used in the foreground to give a majestic and powerful appearance, while pale ink is used in the background to create a ethereal and distant feeling. The mid-ground is formed by rich and thick wet ink, with extremely bold lines, displaying the splattering ink momentum of Zen paintings. Princess Kaguya's second emotional outburst occurs after experiencing the hypocritical visit of high-ranking officials, feeling extremely suppressed and constrained, even causing a man to die for her, resulting in her feeling terrified and guilty, fleeing into the

wilderness and wildly whipping the flowers, plants, and trees. In the afternoon courtyard, her mother holds Princess Kaguya, and through the conversation with her mother, the film uses dense ink and heavy colors to depict Princess Kaguya's hands and the flowers she touches, with thick outlines, showing her anger and sorrow.

In the animation film "The Tale of the Princess Kaguya," director Isao Takahata handles the relationship between animation film and technology, commercial intent, and artistic pursuit without hesitation, allowing ink paintings to come alive and be displayed on the digital screen, demonstrating the inclusiveness of technology in film and the earnest and sincere representation of film visual effects, which is stunning. Japanese cultural thought emphasizes spiritual expression, which has positive reference significance for the development of our animation industry. We should not only learn from its excellent visual technology but also choose materials with good story cores, integrate traditional fine arts into animation production, and achieve the cultural function of animated works through artistic techniques.



Figure 69 Stills from *The Tale of Princess Kaguya* (6)
Source: The Movie Database

4) Music Accompaniment

Isao Takahata invited Joe Hisaishi, a top Japanese composer, to create the music. They chose the ethereal singing style of Nijō Kotomi to perform the theme song, accompanied by pure piano melodies and beautiful lyrics, expressing a profound poetic sentiment. Hisaishi skillfully incorporated elements such as Japanese folk tunes, nursery rhymes, and guqin, ensuring perfect harmony between sound and

imagery. These subtle and understated sound effects, like hidden ink or vermillion, seep into the audience's emotions.

The music at the end of the film, "Memories of Life," sung by Nijō Kotomi, employs a samba-style composition by Hisaishi to depict the divine qualities of the moon palace fairy procession. Combined with the ink painting-style imagery, the moon palace fairies dance on auspicious clouds, swaying their bodies to the rhythm of the band, creating a relaxed, free, pure, and harmonious atmosphere. The fresh music embodies the essential characteristics of Zen aesthetics, experiencing the "emptiness."

One of the outstanding features of excellent films lies in the exquisite integration of sound and imagery. The realism of sound can be compatible with the narrative structure, and background music and sound elements interact to convey specific emotional tones, enhancing the film's impact. The expressive power of sound in "The Tale of Princess Kaguya" directly strikes at the film's essence, returning to simplicity, purifying the soul, freeing the spirit from worldly distractions, and achieving a state of freedom without restraints.

4 The animated film "The Big Bad Fox and Other Tales" (2017, France)

1) Expression of the Story Theme

In recent years, animated films have burgeoned, bringing forth many well-crafted, whimsical works that bring endless joy to children. Among the five animated feature films nominated for the 90th Academy Awards, including the eventual winner "Coco", two-thirds of the films employed 3D animation technology. Clearly, large animation studios like Disney have become the mainstream trendsetters in animation. In stark contrast are independent animated works, which often target adult audiences, exploring social issues through the art form of animation, no longer confined to the innocent world of children. However, excellent animated films should transcend age boundaries, providing education for children while allowing adults to re-experience the pure joy of childhood. French animated films such as "The Little Prince," "Minuscule: Valley of the Lost Ants," and "Ernest & Celestine" are renowned not for their high technology but for their interesting and meaningful themes.

"The Big Bad Fox and Other Tales" is hailed for its innovative narrative structure, mainly reflected in the following aspects: firstly, the film employs a nested structure and blends fragmentary storytelling techniques, presenting a complex internal-external alternation, thereby enhancing the drama and viewing experience. Secondly, the film integrates multiple picture book stories and cleverly interconnects them through a "stage play" plot setting, improving the interaction between storytellers and audiences, showcasing the integration and reconstruction of picture book and film narrative modes. Lastly, the film's fresh and natural picture book style and its use of negative space, returning to traditional styles, combined with the presentation of thematic metaphors and symbols, make the film not only unique in form but also rich in profound philosophy, attracting audiences of different tastes. In summary, the film's narrative innovation and integration make "The Big Bad Fox and Other Tales" a highly creative work.



Figure 70 Stills from *The Big Bad Fox and Other Tales* (2)

Source: The Movie Database

The integration of nested structures and fragmented storytelling is an innovative narrative approach that enriches the film's storytelling. In the movie, this technique allows audiences to experience different storylines between different segments, increasing the enjoyment and depth of the viewing experience. For example, by embedding a stage play within the narrative structure of the animated film through "play within a play," the film not only links multiple picture book stories but also enhances the interaction between storytellers and audiences, making the entire film more vivid and enjoyable. This creative narrative technique not only expands the

narrative possibilities of the film but also deepens the emotional connection between the film and the audience, making the film more engaging.

Through creative intertextual expression, "The Big Bad Fox and Other Tales" ingeniously employs thematic metaphors and symbols, presenting a visually rich and philosophically meaningful spectacle for the audience. The film's unconventional characterizations break the traditional stereotype, blurring the boundaries between "good" and "bad," allowing the audience to experience the complexity and diversity of real life within the characters. Additionally, the film adopts a traditional watercolor painting style, sharply contrasting with mainstream 3D animation, creating a fresh and natural artistic atmosphere through the "negative space" technique, sparking endless imagination. This creative intertextual expression makes the film not only suitable for children but also resonates with adult audiences, conveying the theme of maturity alongside innocence, enriching the audience's contemplation of humanity, social culture, and other aspects, showcasing the film's unique artistic charm.



Figure 71 Stills from *The Big Bad Fox and Other Tales* (3)

Source: The Movie Database

Despite the film's pursuit of whimsy and a touch of madness, it carries profound meaning, prompting reflection amid laughter. For children, it's a heartwarming story about love and courage; three little friends encounter numerous difficulties while escorting a human baby home but never give up; three chicks mistake the big bad fox for their mother, and even after finding their true mother, they still harbor deep affection for the "bad fox mom"; the rabbit and the duck, due to a misunderstanding, have to undertake the mission of saving Christmas. These animal

characters, though not clever and sometimes well-intentioned mischief-makers, convey values of truth, goodness, and beauty to children in a playful manner. For adults, these stories are about educational anecdotes about caring for children, involving their safety, growth, and dreams, all of which require the attention and guardianship of parents. The little animals in the film patiently complete various difficult tasks; how can real-life parents not invest more love and responsibility?

"The Big Bad Fox and Other Tales" combines amusement with profundity in its themes, allowing children to experience love and courage, while enabling adults to delve into deeper meanings through heartwarming plots and refreshing visuals, interpreting and exploring the treasure trove at the core of fairy tales.

In American animated works, a series of heroic figures often appear, possessing extraordinary superpowers and bearing the heavy responsibility of saving the world. For example, works like "Mulan," "The Prince of Egypt," and "Frozen" feature ordinary animal characters endowed with human-like thinking and heroic intelligence, such as in "The Lion King," "Zootopia," and "Ice Age." Japanese animations tend to be even richer in such elements, primarily focusing on character-centric narratives.



Figure 72 Stills from *The Big Bad Fox and Other Tales* (4)

Source: The Movie Database

2) Preliminary Art Design

"The Big Bad Fox and Other Tales" also has its uniqueness. Firstly, the film adopts a hand-drawn style, giving a warm and cozy feeling. Secondly, the film's use of color is diverse, providing visual enjoyment for the audience. Additionally, the film

employs exaggerated expressions and body movements to portray characters' emotions and actions, making their emotions more vivid and interesting. Lastly, the film's plot design is also ingenious, interweaving three independents yet interconnected short stories to form a complete storyline, maintaining the audience's interest while increasing the story's amusement.

"The Big Bad Fox and Other Tales" ingeniously combines the play within the play with the animated film, adding drama to the story's twists and affirmations by setting the stage play as an internal narrative level. The entire film resembles a documentary about a stage play, from the opening to the closing credits, presenting the entire process of the stage play. Meanwhile, the film presents itself in a fresh and natural picture book style, contrasting sharply with traditional 3D animation and emphasizing artistic qualities. Through this alternating narrative approach, a multi-symbolic world is constructed, enhancing the audience's sense of immersion. Additionally, the fox's introduction, other animals' interventions, and other interactive methods elevate the interaction between the narrator and the audience, cleverly integrating the narrative styles of picture books and films. Overall, the film achieves an ideal expressive realm through nested structures, minimalist art style, and purposeful symbolism, conveying profound messages while maintaining entertainment value.



Figure 73 Stills from *The Big Bad Fox and Other Tales* (5)
Source: The Movie Database

In animated films, the relationship between the audience and the actors differs significantly from that in stage plays. In animated films, the audience is not present in

the same time and space as real actors but interacts with the imagery and animated characters. The audience's perspective is limited by the camera's movements rather than fixed in one position. Since animated characters are not real, the distance between the audience and the actors is greater, and the sense of reality is weaker. In animated films, the audience needs to rely more on "empathy" to immerse themselves in the story by projecting their emotions and imaginations. Unlike the fixed audience seats in stage plays, the audience's perspective in animated films is more flexible and can change with the development of the story. In general, the relationship between the audience and the actors is more virtualized in animated films, requiring imagination and emotional projection to establish connections.

The film faithfully continues the fresh and elegant watercolor style of the original picture book. The seemingly casual brushstrokes embody the author's profound understanding of the audience's psychology and solid painting skills. The composition, character dynamics, and scene descriptions in the film capture the characters' expressions and personalities with concise lines, making them vivid. The character design is simple yet lively, catering to the aesthetic preferences of child viewers. Producer Brenner shared, "In the art of giving life to characters with just a few strokes, we can feel a profound warmth and humanity, which is a return to the essence of this artistic expression." Director Renner also expressed his creative philosophy: "I have always wanted to showcase expressiveness, humor, and rhythm in my works by constructing a primitive and natural tone. For me, expressive lines with a few strokes are like a font, and what these fonts write is those sketches that quickly take shape on paper. Instead of describing 'this fox looks shocked,' it's better to draw it directly, even if it's simplified, it still has uniqueness."

The creative picture book style of "minimalism" is reflected in the characteristics of fewer details and more blank space in the visual details. This minimalist and refined style gives the audience greater space for imagination, stimulating their creativity and reading interests. Through concise lines and layouts, the picture book style creates a fresh and natural atmosphere, emphasizing the uniqueness of personal style, making the work more artistic. In animated films, this technique of leaving blank spaces contrasts sharply with CG-produced animations but deepens the film's implications, leaving a profound impression on viewers. Through the concise depiction of scenes and characters, viewers can better feel the emotions and subtleties of the work, thus creating a deeper resonance. The artistic implications of the "minimalism" of the picture book style not only manifest in visual effects but also integrate into the entire storyline, endowing the work with unique charm and artistic value.

3) Processing of Audiovisual Language

Another feature of the film lies in its treatment of audiovisual language. Panoramic shots dominate, avoiding the fast-paced editing and exaggerated compositions common in Hollywood animation. This not only continues the tradition of French art films but also carefully crafts the stage play and picture book spaces. Watching this film is like reading a vivid picture book.



Figure 74 Stills from *The Big Bad Fox and Other Tales* (6)
Source: The Movie Database

French animation stands out in the animation industry like artists with unique styles. It seems to value the display of personality more than following the so-called "mainstream," and this independent spirit seems more important than box office results. Looking back at the exemplary "The King and the Mockingbird" in 1979, which is revered by the global animation industry for its fine production, intelligent humor and political metaphors, deeply influencing many creators including Japanese animation master Hayao Miyazaki; "The Book of the Desert" in 1984 cleverly combined Cel animation and paper-cut art; the acclaimed "Kirikou and the Sorceress" in 1988 fused African and Japanese art styles with French local animation, winning wide acclaim and box office success. When the film was released in the United States, it even reminded the audience that this is not a typical Disney film, featuring not only naked female characters but also directly exploring the themes of life and death. Subsequent works like "The Triplets of Belleville," "The Illusionist," and "Persepolis" have become classics of world animation. These films not only demonstrate strong

individuality in narrative but also stand out in art style, narrative techniques, and other aspects, which is one of the proud characteristics of French animation.

This work also continues the unique thematic style of French animation. The film's amusement is primarily reflected in its plot design, divided into three interrelated yet independent short stories: "The Big Bad Fox," "A Baby to Deliver," "The Big Bad Fox," and "Christmas Mission." The reason for naming it "The Big Bad Fox" is twofold: on one hand, it is one of the three stories, and on the other hand, the big bad fox also serves as the narrator, breaking the fourth wall, shortening the distance between the audience and the characters, creating a sensation akin to watching a stage play. The protagonists in the film are a group of small animals on the farm. They differ from the clever and super-powered characters in traditional animations, instead portraying themselves realistically, presenting a series of comedic stories and unexpected events, adding richness to the film's humor. Although these stories are based on familiar fairy tales and fables, each character exhibits distinct personality and exaggerated behavior, making the simple plots vivid and interesting.

American animated works often revolve around hero figures, constructing intricate plots and utilizing cutting-edge CGI technology to create stunning visual effects. Influenced by this trend, Chinese and Japanese animated films have gradually adopted similar production patterns. In contrast, French animation has chosen a different path, preferring to tell stories of ordinary people. Therefore, the plots are more concise and direct, and the visual style avoids the use of overly sophisticated technical treatments, sometimes even returning to hand-drawn art styles, pursuing a more generalized and expressive approach.

"The Big Bad Fox Story" and "Ernest & Celestine" are both directed by Benjamin Renner, adopting a simple and light hand-drawn style, providing audiences with an experience of simplicity and authenticity. This minimalist hand-drawn style may seem simple, but it is not rough; although animal characters are outlined with only a few strokes, their facial expressions and movements are carefully designed. The facial expressions of the animals in the film are rich and colorful, allowing the audience to feel the amusement of the plot through these vivid expressions. For children, these simple hand-drawn lines depict vibrant character images, and the use of watercolor gradients also aligns well with their initial understanding of drawing. Adults may find the story somewhat childish, but the fresh and simple style can provide a relaxing and enjoyable visual experience after watching too many dazzling special effects in American animations. "The Big Bad Fox Story" allows viewers to relax and enjoy the amusing stories performed by these lively and adorable animals without worrying about plot twists or the fate of the protagonists. Any audience

member who has watched this film will feel its unique charm, as if returning to childhood, when we held simple comic books and first encountered the world of animation.

5 The animated film "Wolf Walker" (2020, Ireland)

1) Expression of the Story Theme

In the film's narrative, the struggle for cultural hegemony is depicted as a territorial battle between humans and wolf packs—representing the encroachment of the city upon the forest, as well as the restrictions and oppressions of divine authority, royal authority, and patriarchy on freedom and humanity. The city and the forest serve as symbols representing the two major camps of human society and the wolf clan society.



Figure 75 Stills from *Wolf Walker* (2)

Source: The Movie Database

"The Wolfwalkers" draws rich creative material from Irish folklore. "The Secret of Kells" is inspired by the Irish national treasure, the Book of Kells, telling the story of a young boy overcoming difficulties to illustrate manuscripts. The presence of wolves in Irish folklore reflects the significant role of wolves in Irish history. Additionally, the Celtic art illuminated manuscripts created by Irish monks provide rich visual elements for the film. Through the exploration of these folklore and artistic traditions, the film successfully integrates Irish national history and culture, presenting a mysterious and emotionally charged story world to the audience.

Simultaneously, the film serves as an animated reflection of Irish history under British colonization, portraying Ireland as a wild and untamed land subjected to

British colonial aggression. Irish history is marked by repeated invasions and conquests, with Celtic culture serving as a spiritual pillar against aggression. Through the integration and expression of ethnic elements, the film showcases hero stories and mythical legends from Irish folklore, attracting curiosity and exploration of Irish culture from different countries and ethnicities. Through this creative approach, the film effectively disseminates Irish national culture, serving as a valuable resource for study and inspiration.

The human society represented by the city is characterized by patriarchy, with men dominating all social decision-making, while female characters typically only appear in laundry rooms, responsible for washing and cleaning. The Lord Protector, as the representative of the highest authority in human society, embodies both royal authority and divine authority; while the hunter Bill, directly commanded by the Lord Protector and the father of the protagonist Robin, is a typical symbol of patriarchy. Robin and Bill are newcomers in the film, having moved from England to Ireland, representing the perspective of urban dwellers. As newcomers, Bill always keeps Robin at home, prohibiting her from going out to avoid being brought under the unified management of the Lord Protector. However, when Robin secretly follows her father out and encounters local children in the city, the unfriendly treatment she receives reflects the locals' rejection of newcomers. Bill carries tools and traps to exterminate wolf packs, which are not only practical but also symbolize his inner constraints. These constraints stem from fear and blind obedience to royal authority. At the end of the film, Bill pushes the Lord Protector down into the abyss, symbolizing his final break from internal shackles and achieving self-redemption.

The wolf society depicted in the forest is a manifestation of Celtic matrilineal clans. According to modern biological research, female wolves, due to higher levels of testosterone, are stronger than male wolves and occupy dominant positions within the group, as also portrayed in the film. Míba and her mother, being forest natives and wolf walkers in the story, command the wolf pack and live together with them in the forest away from the city, representing a conquered and uncivilized perspective, reflecting a matriarchal society. As the plot develops, Míba's mother learns of the humans' plan to eliminate the wolf pack and decides to lead the pack in search of a new habitat. They have never had any intention of harming humans or competing for land with them until Míba witnesses her mother being injured, prompting her determination to seek revenge against the people in the city. This starkly contrasts with the notion instilled by the Lord Protector that "wolves are evil and dangerous", prompting people to ponder whether the "danger" of the wolf pack and the "barbarism" of the Irish people are merely labels imposed by the aggressors.

Historically, with the development of productive forces and the emergence of private ownership, matriarchal societies have gradually been replaced by patriarchal ones, a trend also reflected in the film. The opposition between patriarchy and matriarchy mirrors the conflict of ideas between oppression and exploitation, freedom and sharing. At the same time, the opposition between the city and the forest also symbolizes the "civilization conquest" between urbanized England and rural Ireland.



Figure 76 Stills from *Wolf Walker* (3)
Source: The Movie Database

2) Preliminary Art Design

The most exciting scene in the entire film is the transformation of Robyn and Míba into wolves running freely in the forest at night. Against the backdrop of a harmonious and tranquil night scene, they lead the audience to appreciate the natural landscapes vastly different from the city, where elements decorated with spirals and straight lines complement each other, showcasing the unique visual dynamics of hand-drawn animation. Meanwhile, the chanting of the theme song "Running with The Wolves" and the light melody of the music blend with the vibrant forest night scene, creating a strong emotional impact. When everything quiets down, Robyn and Míba comfort each other under the starry sky, making plans for the future, while life in the forest silently grows and reproduces, demonstrating the vigorous vitality and selfless dedication of nature.

This work also reflects the significance of mirrored characters and spaces in the film. Lacan's theory of the mirror suggests that individuals recognize themselves through the "other" in the mirror, which is a result of their own illusionary

imagination. In "Wolfwalkers," the spatial relationship between characters and the environment and the construction of internal spaces in the film demonstrate class differences and social status disparities. The mirrored relationships between characters, such as Robyn and Míba, reveal their inner desires and the satisfaction of unfulfilled emotions, leading to their growth and transformation. In "The Secret of Kells," creative and personalized artistic expressions are achieved through horizontal contrasts and spatial displacement of characters, outlining their growth trajectory. At the same time, Celtic traditional cultural symbols such as single spirals and double spirals, symbolizing birth and growth, are used to drive the narrative. These symbols are integrated with modern societal values and emotional insights, showcasing the fusion of ethnic spirit and aesthetic perception. Therefore, the significance of mirrored characters and spaces in the film reveals rich connotations and profound meanings.

In the aspects of visual narrative, architectural design, and character development, the creative team has ingeniously integrated profound meanings and ingenuity into the entire work, imbuing it with symbolism of class struggle. This symbolism is particularly evident in the spatial relationships between characters and their environment, as well as within the internal spatial structure of the film.

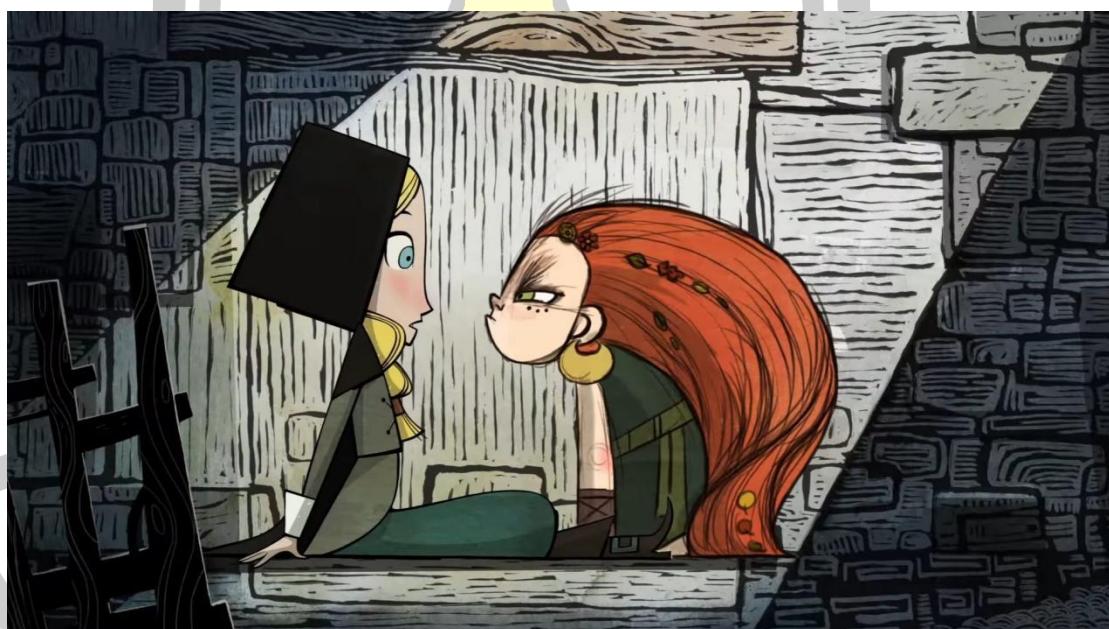


Figure 77 Stills from *Wolf Walker* (4)

Source: The Movie Database

Through the use of "high" and "low" positions of characters in space, the film continuously emphasizes social class differences. For example, when the Duke brandishes a butcher's knife approaching the unconscious Robin, the cluster of jagged stone teeth behind her not only highlights her vulnerability but also intensifies the

crisis and tension, accentuating the Duke's contempt and brutality towards life. The rapid switching of tilted perspectives generates a strong sense of instability, accelerating Bill's psychological tension during his daughter's rescue and portraying shifts in power dynamics through weightlessness.

Moreover, in designing the spaces occupied by the Duke, the film particularly emphasizes the sense of depth in architectural structures and the richness of luxurious decorations within the scenes. Horizontal lines and right angles are used to highlight the geometric beauty of space, and different image proportions are employed to position characters in various locations, further reinforcing the sense of alienation and oppression under authority. The dullness of the urban landscape and scene layout symbolize industrial civilization. The Duke's command to soldiers to fell forests reveals humanity's plunder of nature, satirizing the continual expansion of cities under modern civilization and the destruction of forests and life, reflecting the creators' criticism of human desires.

While deepening the theme, "Wolfwalkers" also showcases the unique charm of Irish traditional culture, integrating modern human emotions with ancient culture, and achieving communication between reality and imagination through the artistic form of film. The film not only draws on the essence of Celtic culture, displaying the immortal national spirit, but also incorporates modern societal values, aesthetics, and emotional experiences into brilliant visual performances. Tomm Moore insists on extracting inspiration from Irish national culture in his creation, refining elements rich in traditional cultural heritage, reshaping and rewriting the essence of traditional national culture while satisfying the aesthetic needs of modern audiences. He injects profound reflections on humanity, emotions, modern civilization, and nature into the film, delving into diverse themes such as cultural conflicts, various forms of power oppression, love and belonging, individual growth, and self-redemption, providing strong narrative momentum for the film. These elements not only resonate with audiences through the combination of traditional culture and human emotions but also elevate aesthetic value through imagery creation in the style of ethnic aesthetics.

The film "Wolfwalker" draws visual inspiration from Celtic illuminated manuscripts, employing the intricate and exquisite decorative style of Celtic art. By continuing and applying the style of Celtic illuminated manuscripts in terms of lines, colors, and composition, the film achieves visual expression of the conflicts and tensions among characters and plot elements. In character design, the sharp geometric shapes represent the sharpness and stubbornness of characters such as Protector and Hunter Bill, while the full and rounded lines represent the personality traits of Mebh,

her mother, and the wolf pack. This contrasting character design accomplishes the expression of personality conflicts among characters.

The visual style of the entire film is derived from the strong and distinctive decorative characteristics of Celtic art, integrating the decorative style of folk manuscript illustration into the film, presenting a unique and historically accurate artistic style.



Figure 78 Stills from *Wolf Walker* (5)

Source: The Movie Database

"Wolfwalker" draws inspiration from the complex and beautiful decorative paintings of Celtic art in its drawing style, integrating this folk manuscript marginal decoration style into animation creation. In fact, this unique style was explicitly established in the early creations of Cartoon Saloon Animation Studio - "The Book of Kells" provided them with a visual aesthetic reference. In the early Middle Ages, when English missionaries arrived in Ireland and spread Christianity, numerous monasteries needed a large number of literary works and religious texts to convey "the teachings of God." By copying and embellishing biblical texts and illustrations, Irish monks created illuminated manuscripts that combined Celtic art with religious content. "The Book of Kells," the most famous of these Gospels, far surpasses other island Gospels in its luxury and complexity, serving as a paradigm of Celtic art.

From "The Book of Kells," it can be seen that its decorative style is strong, and its forms and colors have distinctive features. "The characteristic of Celtic art is to avoid imitating or approximating the natural forms of animals and plants, but to transform everything into pure decoration. In the creation of decorative art, they

prefer to use dense energy, enclosed spirals or reliefs, long and large arcs, and rich alternating intervals. Through these concise but meaningful lines, they have developed an aesthetic, delicate, and varied decorative system." However, the significance of Celtic art is not only in the decorative aspect of art for art's sake. "For those who can interpret them, the selection and arrangement of patterns are full of meaning, possibly representing identity and status, and can provide the owner with a certain degree of divine protection." Therefore, the patterns of Celtic art themselves embody devout national beliefs. "The Book of Kells" is the product of the combination of national and religious beliefs, cherished by the Irish people as a national treasure.

According to Gombrich's view, patterns are a psychological tendency of human beings to perceive objects in ways such as order, rhythm, harmony, and simplification. In "The Secret of Kells," Tomm Moore successfully applied these visual images containing ethnic codes into the film. The film was a great success upon its release, and Cartoon Saloon Animation Studio established its unique artistic style, consistently maintaining "as faithful as possible to the Celtic shapes found in 'The Book of Kells,' which is where they found coherence and historical accuracy."

"Wolfwalker" continues the lines, colors, and composition of Celtic illuminated manuscript marginal decoration style and combines them with the opposing settings of the film, achieving visual expression of conflicts and tensions among characters and plot elements. In the expression of spatial perception, the city appears with sharp and cold images, while the forest is warm and soft. Straight lines are sharp and stubborn, conveying a sense of oppression and restraint in the urban space; curves are full and dynamic, conveying a sense of freedom and richness in the forest space. Co-director Ross Stewart explains, "Because the town is Robin's cage, everything has to reinforce this feeling, so there are many black lines and sharp angles, which are very radical signs and patterns. It creates a maze-like cage that Robin finds it difficult to escape from because she is trapped there, constrained by social rules." Additionally, color is an important element in shaping emotional experiences. The urban space is not only angular and sharp in shape, but also predominantly gray and cool in color, appearing cold and dull; only when displaying the high authority pressure of the Protector is vivid crimson used, as if to burn down the entire lifeless city. In contrast, the forest space has soft and varied lines and warm and rich colors, perfectly echoing Robin's oppressed, restrained, and fearful state in the city and her free and joyful psychological experience in the forest.

In the expression of character personality contrasts, urban characters are depicted as tough and stubborn, while the wolf walkers are portrayed as round and

warm. The characters in the film, such as Protector Sean and hunter Bill, as well as Robin, who is dominated in the city, are predominantly depicted with angular geometric shapes, while Meeba, her mother, and the wolf pack are depicted with full and round flowing lines, achieving a visual expression of contrasting personalities. Whether sharp and stubborn or full and round, the character designs in the film originate from the hand-drawn style passed down from illuminated manuscripts. Firstly, the character designs resemble Hollywood's non-articulated style, reducing the prominence of joint connections and displaying dynamics through overall line variations, which is distinct from Japan's realism style. Secondly, facial features are often outlined with simple contours and colors, omitting detailed layering and refinement. Skeletal contours simplify lines connecting the brow and nose, while the black iris areas are large and filled with flat color blocks, fully showcasing the simplified and abstracted characteristics of hand-drawn artistic patterns.



Figure 79 Stills from *Wolf Walker* (6)
Source: The Movie Database

Through director Tom Moore's recognition and adherence to Celtic culture in the film "Wolfwalkers," audio-visual aesthetics intertwine with metaphorical imagery. The film employs purely dynamic 2D hand-drawn images, highlighting the intercultural narrative of modern aesthetics and humanistic sentiments, breaking down multicultural barriers and revealing cultural subconscious and ethnic aesthetic sentiments within specific historical contexts. Regarding mirrored characters and spatial representation, the film uses cinematographic language, architectural space, and character shaping to express class metaphors, demonstrating social status

disparities through characters' positions in space. Additionally, the film utilizes Celtic traditional cultural symbols and visual elements to present symbolic and metaphorical functions, punctuating ethnic sentiment writing with bright and dark visual contrasts, evoking audience empathy and forming a traditional ethnic aesthetic style. In conclusion, the film combines audio-visual aesthetics with metaphorical imagery, demonstrating the fusion of modern aesthetics and traditional ethnic spirits, presenting rich cultural connotations and artistic value.



Figure 80 Stills from *Wolf Walker* (7)
Source: The Movie Database

The stylized presentation of objects and the vivid use of color in "Wolfwalkers" are also prominent in visual design, becoming important means to express symbolism and metaphor and contributing to classic aesthetic expression true to the film's content. The residents and soldiers in the city have their hair wrapped in hats, armor, and cloaks, indicating an attitude of indifference and refusal to communicate, with these exaggerated and simplistic designs suggesting the deprivation of hope and free will. When Robin succumbs to her father Bill's demands, she is always wearing a cloak or wrapping her head with a scarf; Bill raising the bow against Meeba's mother becomes the final straw for Robin's rebellion. At the moment when the black borders around the screen expand and violently shake closer to the center, Robin decisively removes her scarf, and her golden hair fills the entire screen, completely eliminating the black borders. The continuous actions give the characters a sense of reality, creating continuous narrative tension and emotional appeal, and the metaphorical function of objects is fully realized. For animated films, "color is one of

the most intuitive audio-visual elements, and its use is where the imaginative charm of animation lies. The concreteness of color can recreate reality, and its abstraction can convey the deeper meanings the creator embeds in the text." Tom Moore uses color as an important representational element in his animated films, with the colors of main characters usually matching their personalities, while environmental colors change with characters' psychological states and plot developments. The most prominent colors in the film are red and black, with large areas of blending. Red represents bloodshed and flames, while black signifies violence and contempt for life. As humans attempt to eradicate the wolf pack, the blood-red sunset illuminates the entire city, foreshadowing the imminent outbreak of the human-wolf war.

6 The animated short film "Boy, Mole, Fox and Horse" (2022, UK & USA)

1) Expression of the Story Theme

"Boy, Mole, Fox, and Horse" is categorized as a "healing journey film" mainly because it emphasizes the themes of love and growth in its narrative. Through simple and clear lines and a soothing rhythm, it conveys a sense of comfort and return to shattered hearts. Unlike traditional road movies that resist established orders, "Boy, Mole, Fox, and Horse" explores and advocates mainstream values such as family through the journey of the boy and his companions in the wilderness. Against the backdrop of the post-pandemic era, this film, with its healing emotional expression, gives audiences a sense of warmth and comfort, thus being considered characteristic of a "healing journey film".

The characteristics of this animated film lie in its simple and clear storyline and its gentle and soothing narrative style. The film does not have complex plot designs or intense conflicts, but rather tells a story about love and growth through clear lines and a gentle rhythm. The protagonist, a boy, and his travel companions, the mole, the fox, and the horse, embark on a journey full of warmth and touching moments in the snow-covered wilderness. This healing narrative style and the return to mainstream values such as family create widespread attention and recognition for this animated film against the backdrop of the post-pandemic era. Through its simple yet profound story, audiences can find solace and enlightenment, which is one of the reasons the film won the Oscar.

The storyline of this animated film is simple and straightforward, portraying the emotional changes between the boy and his three companions on their journey through a linear structure. Set in a wilderness covered by vast snow, the interactions among the boy and his companions are heartwarming and healing, without complex plot designs or intense conflicts. The narrative style is gentle and soothing, creating a warm and peaceful atmosphere through delicate imagery and gentle music, providing audiences with relaxation and warmth. In terms of character portrayal, the fox, labeled as "cunning," is depicted as a kind-hearted character with a tough exterior, demonstrating an understanding of humanity and goodwill. Overall, the storyline of this animated film is simple yet emotionally sincere, its narrative style warm and healing, and its symbolic imagery creating a magical chemistry, bringing warmth to the audience's hearts.



Figure 81 Stills from *Boy, Mole, Fox and Horse* (2)

Source: The Movie Database

The emotional progression within a linear structure is depicted through a single main storyline, showing the gradual changes and growth of the characters' emotions. In the animated short film "Boy, Mole, Fox, and Horse," the boy gradually establishes emotional connections with the mole, the fox, and the horse during his journey, experiencing psychological changes from being strangers to being familiar and from loneliness to dependence. This emotional progression not only allows audiences to more intuitively feel the emotional connections between the characters but also guides them to reflect on the emotional interactions among people. Through the progression of the boy's emotions toward his animal companions, audiences can

feel the power and warmth of human emotions, allowing them to experience healing and comfort in their souls while appreciating the film. Such emotional progression enables audiences to better appreciate the human warmth and emotional resonance conveyed by the film, bringing about a healing effect to their souls.

"Boy, Mole, Fox, and Horse" employs symbolic techniques to embody themes of warmth and healing. Through character portrayal and dialogue, it expresses the importance of human inner beauty and emotional strength. The characters in the film, including the boy, the mole, the fox, and the horse, all have implicit philosophical meanings, with no clear distinction between good and evil, but rather revealing inner softness and kindness. Scenes of a wilderness covered in white snow and the boy wearing thin clothes without feeling cold create symbolic imagery, allowing the audience to find relaxation and healing power amid busy lives. The details and language in the film carry philosophical meanings, evoking emotional resonance and prompting people to reexamine the true values and beauty of life. This delicate and warm expression makes the film a work with profound connotations and emotional resonance, triggering people's reflections and insights into their inner worlds.

The four main characters each have their own characteristics, with distinct strengths and weaknesses. The boy is confused and lonely but grows during the journey. The mole is compassionate and brave, offering help boldly, but limited by its size, it finds it difficult to act in nature. The fox is clever and capable; its tough exterior serves as a disguise for its fragile heart. The horse is robust and responsible, caring for others but caring too much about others' opinions. This multi-scenario, multi-character setting allows readers and viewers to see themselves reflected in these characters. People who share similar traits with these four characters will see themselves mirrored in them. In a world dominated by materialism, everyone can lose themselves, but the film hopes that people will still choose hope and mutual assistance, even though not everyone is fortunate enough to encounter someone as warm-hearted as the mole.

Indeed, the metaphor here is quite straightforward: the wilderness represents people's lives. The wilderness is beautiful, yet occasionally terrifying; it can be calm and sunny, or stormy with fierce winds and rain. The characters of the boy, mole, fox, and horse are inherently lonely. Even when the fox falls into a trap, it doesn't forget to threaten the mole, yet the mole still extends a helping hand. They all yearn to find a home of their own, so they travel together, only to realize in the end that the friends by their side are what they truly need. In a modern society dominated by materialism, loneliness and confusion are common issues; people often neglect spiritual happiness and the meaning of life in pursuit of material possessions. Through their marvelous

journey, the boy, mole, fox, and horse tell us that inner contentment is the true satisfaction.



Figure 82 Stills from *Boy, Mole, Fox and Horse* (3)

Source: The Movie Database

2) Expression of Watercolor Language

One of the most commendable aspects of "The Boy, the Mole, the Fox, and the Horse" is its visuals. Similar to "Loving Vincent" (2017), which was done in hand-painted oil paintings, this film is also done in hand-drawn animation. The animation involved over 120 individuals from more than 20 countries/regions. Like an illustrated storybook, every scene in the film is meticulously designed and crafted, with precise lines and rich details, giving the sensation of reading a picture book. Viewers will notice that each character has intricate details and textures, making it highly enjoyable to watch.

"The Boy, the Mole, the Fox, and the Horse" utilizes a simple yet profound watercolor style, creating a warm and healing atmosphere through soft colors and fluid lines. The expression of watercolor art brings the entire work closer to life, providing a sense of comfort and relaxation. In this unique visual style, characters and scenes in the story appear more vivid and endearing, guiding the audience into a world full of warmth and hope. The use of watercolor art adds a soft charm to this "healing journey film," allowing viewers to experience the beautiful emotions of love and growth. Overall, the application of watercolor art in this animated short film not

only presents exquisite and delicate visuals to the audience but also provides a deeper emotional impact on the thematic message of the story.

"The Boy, the Mole, the Fox, and the Horse" combines hand-drawn animation in a watercolor style with digital animation techniques, presenting a unique visual effect. The warmth and softness of watercolor style blend with the smoothness and precision of digital animation, adding a distinctive artistic feel to the film. The gentle tones and rich layers of watercolor bring a unique beauty and liveliness to the film, while the use of digital animation techniques makes the images more vivid and detailed, offering more possibilities for the development of the story. This combination of watercolor and digital animation not only makes the film visually appealing but also provides viewers with a new viewing experience. Through this combination, the film achieves a higher level of artistic expression while conveying thematic ideas and emotions. Changes in color reflect the protagonist's emotional fluctuations. When the boy and his companions feel lost and lonely, the scenes are depicted in cool tones, while moments of hope and friendship are portrayed with warm tones, making it easier to resonate with the audience.

Watercolor, as a unique form of artistic expression, is often used to depict a fresh and elegant, bright and lively visual style. However, integrating watercolor effects into animation is not easy. Watercolor involves many incidental effects such as water stains, gradual transitions of colors, and paint permeation, which pose challenges for animation production. In animation production, the smaller the differences between adjacent frames, the higher the stability of the animation and the smoother the playback. Therefore, achieving watercolor effects in animation requires overcoming these obstacles and finding suitable methods to balance between animation quality and cost.

There are several obstacles in animation production due to the incidental effects of watercolor. Firstly, the natural transitions and color permeation of watercolor are difficult to accurately reproduce in animation because animation requires precise control of each frame, whereas watercolor effects are difficult to control completely. Secondly, the effects of color overlay and flowing are challenging to maintain consistency in animation because each frame in animation needs to maintain a consistent effect, while watercolor characteristics are variable. Finally, it is difficult to simulate the texture and traces of watercolor in animation because animation requires the use of specific software and techniques, which often cannot perfectly reproduce the delicate effects of watercolor. Therefore, to integrate watercolor effects into animation, these obstacles need to be overcome, and a balance

needs to be found in the animation production process to ensure the balance between image quality and production cost.

The animation "The Boy, the Mole, the Fox and the Horse" showcases a series of unique visual characteristics through the artistic style of watercolor painting:

(1) Soft colors: Utilizing the soft tones and smooth transitions of watercolor, the animation may present a warm and comfortable visual effect. The use of light colors and gentle color transitions may be extensive in the scenes, creating a tranquil and harmonious world.

(2) Gradient colors: The gradient characteristics of watercolor can vividly depict the flow and change of colors, adding rich layers and three-dimensional effects to natural landscapes such as the sky, ground, and water surfaces in the animation.

(3) Transparent texture: The transparency of watercolor allows the underlying colors to show through, enhancing the naturalness and artistic charm of the scene.

(4) Flowing strokes: The flowing strokes of watercolor capture dynamics and vitality, especially evident in depicting animal fur and plant leaves, making the characters and environment in the animation appear more vivid and lively.

(5) Depiction of natural elements: Delicate depictions of natural elements such as trees, flowers, and skies in watercolor paintings may be carefully crafted, making the entire animation scene appear more realistic and appealing.

(6) Handmade feel: Watercolor paintings typically retain certain handmade characteristics, such as the diversity of brushstrokes and the natural blending of pigments, adding to the artistic quality and unique charm of the work.



Figure 83 Stills from *Boy, Mole, Fox and Horse* (4)

Source: The Movie Database

The short film "The Boy, the Mole, the Fox and the Horse" successfully integrates its concise and brisk line style with the warm and healing theme of the film and the artistic style of watercolor painting, creating a unique artistic charm. The characteristic of this line style lies in its simplicity and fluency, avoiding complex detail depiction and instead outlining the basic contours of characters and scenes with crisp and clean strokes, presenting a simple beauty in the image, while allowing the audience to directly perceive the sincerity of the story and the subtlety of emotions. Although the lines are simple, through variations in thickness, curvature, density, etc., the film expressively depicts character personalities, emotions, and scene atmospheres. For example, the boy's sensitive and Fox's cunning personalities are reflected through different line characteristics, while the depth and mystery of the forest are shown through dense lines. Additionally, these lines convey rich emotions, shaping not only the forms but also conveying emotions and story connotations. For instance, in portraying moments of loneliness or sadness for the boy, the lines become dim and delicate, while in joyful moments, they become bright and fluid.

The line presentation in this animated short film not only serves as an artistic feature but also enhances visual aesthetics, deepens emotional expression, and enriches the film's content. The concise and brisk lines make the visuals fresher, aiding the audience in capturing characteristics. The subtle variations in lines delicately express character emotions and atmospheres, making emotional communication more compelling. The information conveyed by the lines guides the audience to engage in deeper thinking, aiding in the understanding of the film's themes. Therefore, the line art in "The Boy, the Mole, the Fox, and the Horse" becomes an indispensable artistic component, adding unique charm to the film and effectively conveying its heartwarming and healing themes.

The use of bright and vivid colors in this work successfully blends with the film's heartwarming and healing themes and the artistic style of watercolor painting, creating a unique artistic charm. The distinctive feature of color usage lies in its high brightness and saturation, which not only complements the heartwarming theme but also effectively enhances the joyful and relaxed atmosphere in the film. In terms of color coordination, the film presents a harmonious and unified effect, avoiding conflicts and strong contrasts between colors, making the visuals more comfortable and pleasing to the eye, thus allowing the audience to immerse more easily in the film's warm and healing atmosphere. Furthermore, the colors in the film carry profound symbolism; for instance, blue represents melancholy and sadness, yellow symbolizes hope and happiness, and red reflects passion and vitality. Through such color application, the film conveys rich emotions and information.

The use of color in this animated short film is not only an important artistic feature but also enhances visual aesthetics, deepens emotional expression, and enriches the film's content. Bright and vivid colors make the visuals lively and attract audience attention; the meanings behind the colors effectively convey character emotions and story connotations, making emotional expression more nuanced and moving. Additionally, the rich information within the colors guides the audience to engage in deeper thinking, facilitating the understanding of the film's themes. Therefore, the color usage in "The Boy, the Mole, the Fox, and the Horse" becomes an essential artistic component, adding unique charm to the film and effectively conveying its heartwarming and healing themes.

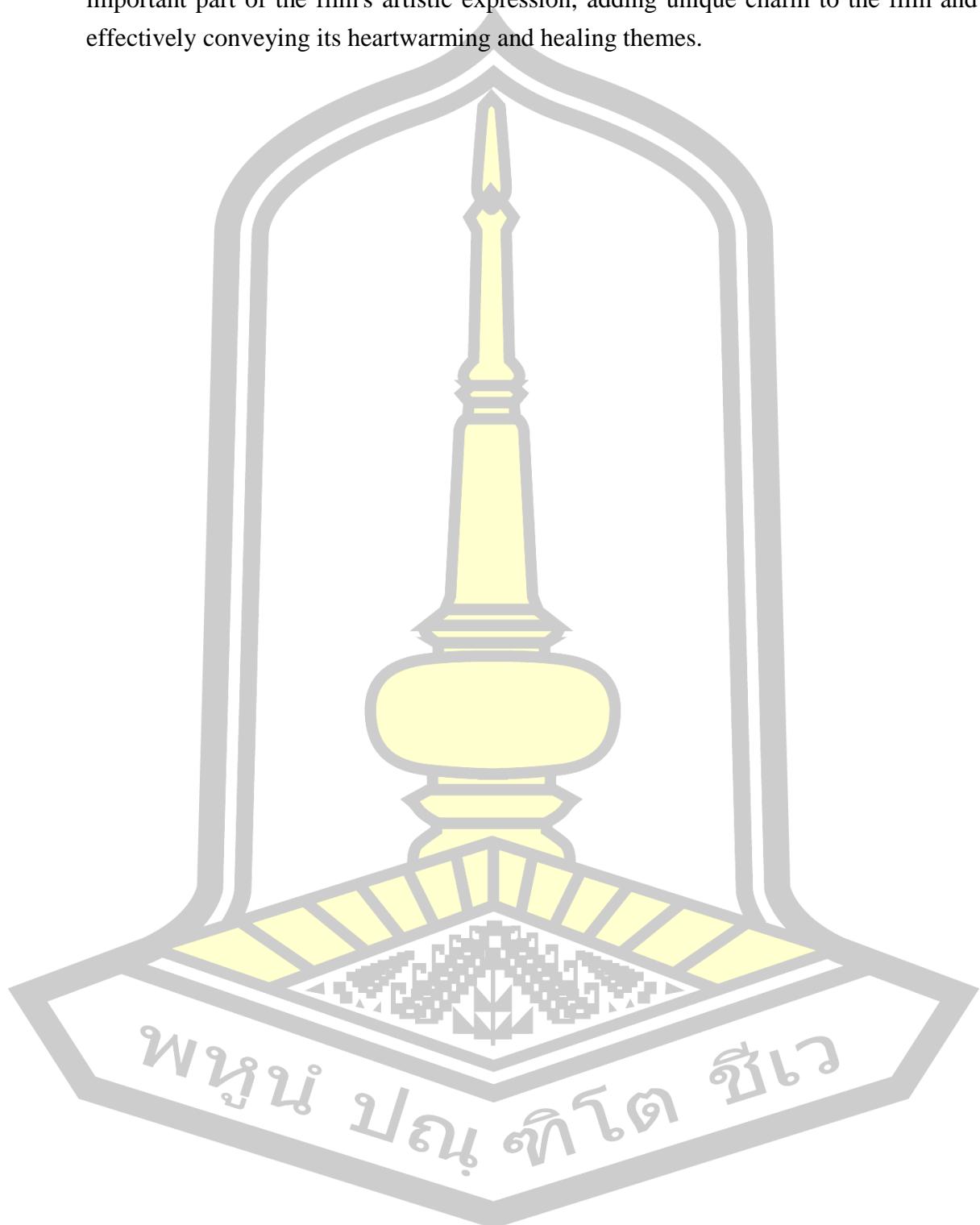


Figure 84 Stills from *Boy, Mole, Fox and Horse* (5)
Source: The Movie Database

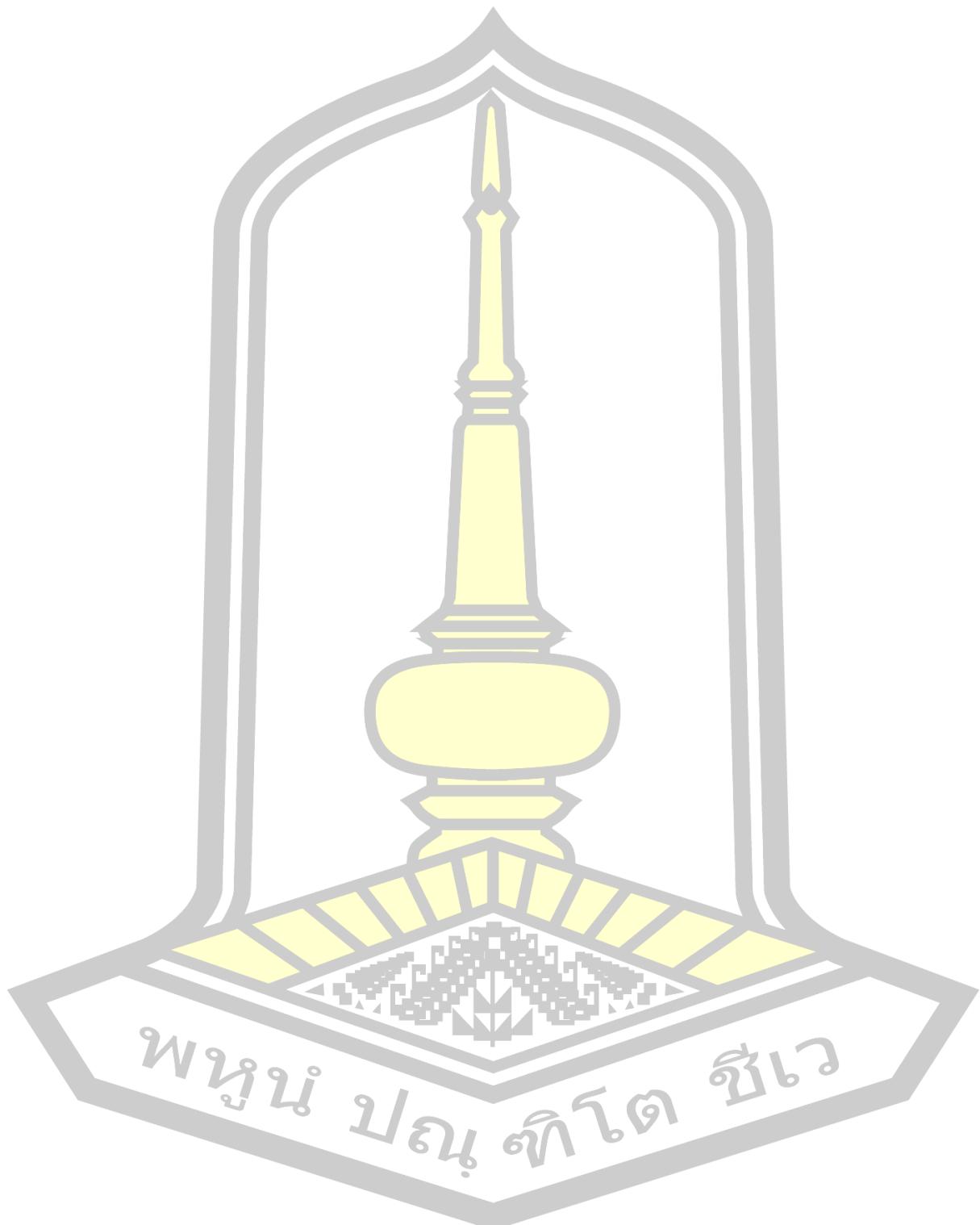
3) Animation Production

In "The Boy, the Mole, the Fox, and the Horse," hand-drawn animation is fully utilized; all scenes, characters, and animals are hand-drawn, and watercolor rendering effects are applied, creating a fresh, dreamy, and artistically expressive imagery. The use of hand-drawn animation is not only a highlight of this animated short film but also greatly enhances the film's artistic appeal. Its unique beauty and texture resonate with the audience, while its subtle expression perfectly conveys the film's themes of friendship, love, and hope, creating an atmosphere of warmth and healing. Furthermore, the laborious process of hand-drawn production reflects the creators' craftsmanship and sincerity, embodying the film's creative spirit. Therefore,

hand-drawn animation in "The Boy, the Mole, the Fox, and the Horse" becomes an important part of the film's artistic expression, adding unique charm to the film and effectively conveying its heartwarming and healing themes.



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