

# Light as a Catalyst: Enhancing Sustainable Visual Aesthetic Education for Photographers

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Received: 13 February 2026 | Accepted: 30 March 2026 | Published: 20 April 2026

DOI: <https://doi.org/10.55057/ajress.2026.8.3.19>

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**Abstract:** *This study takes light modeling as its core entry point to explore its application path and practical value as an aesthetic catalyst in enhancing film and television photographers' awareness of sustainable visual aesthetics. By analyzing the impact of light type, properties, direction, and color on image composition, emotional transmission, and audience psychology, the study systematically integrates light modeling knowledge into the film and television photography teaching system. Using case studies and qualitative research methods, two sets of controlled experiments were conducted to analyze the mechanisms by which different light combinations affect the visual effects and aesthetic perception of images, verifying the actual effectiveness of light modeling instruction in improving students' sustainable visual aesthetic abilities. The study proposes four major teaching strategies: transforming teaching concepts, strengthening the control of lighting atmosphere, simplifying the use of lighting equipment, and flexibly applying the color temperature of light sources. These strategies provide new methods and means for innovation in film and television photography teaching, helping educational institutions to achieve the synergistic cultivation of aesthetic appreciation and narrative function in film and television images, ultimately promoting the formation of sustainable visual aesthetic awareness among photographers.*

**Keywords:** Lighting Design; SDG4; Aesthetic Enhancement; Education

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## 1. Introduction

One of the core aesthetic characteristics of film and television art is image aesthetics, which, through visual expressions such as composition, lighting, and color matching, carries the functions of emotional expression, storytelling, and ideological transmission, and is an indispensable basic element of film and television art (Zhan, 2014). As an important carrier of modern culture, the aesthetic value and technological development of film and television art have always been the focus of academic attention (Long & Han, 2024). Guided by the United Nations Sustainable Development Goals (SDGs), education is gradually shifting from the cultivation of technical skills to the construction of comprehensive literacy, in which sustainable aesthetic awareness has become an important part of comprehensive literacy. At the same time, with the upgrading of new media technologies, film and television art has undergone profound changes in both visual expression and content dimensions, and the exploration boundaries of image visual aesthetics are constantly expanding, bringing new opportunities and challenges to film and television photography education (Kang, 2025).

Light is an important core element in the language of film and television photography; it is the foundation of image composition, emotional presentation, and narrative expression (Xing, 2025). Light not only illuminates objects but also shapes visual aesthetics and emotional atmosphere through variations in brightness, warmth, and direction (Wu & Qin, 2022). Photographers, in using light, are essentially making aesthetic judgments and value choices. They need to pursue not only visual beauty but also storytelling through visual language (Gao, 2022). However, current film and television photography education often prioritizes technique over aesthetics and effects over reflection, leaving students at a technical level and lacking a deep understanding of visual aesthetics and values. Therefore, elevating light to an "aesthetic catalyst" and guiding photographers to understand the aesthetic logic and ethical implications of light through systematic teaching is crucial for cultivating sustainable visual aesthetic awareness.

This study, based on theoretical research on light modeling and practical research in photography teaching, combined with classroom experiments and teaching reflections, explores how light can play a catalytic role in photography education, propelling students from technical application to visual aesthetics and sustainable expression, and helping film and television photography education upgrade from technical instruction to aesthetic literacy cultivation. It provides theoretical and practical references for photography education to serve sustainable development.

## **2. Theoretical Basis of Sustainable Visual Aesthetic Awareness**

### **2.1 Sustainable Development Education and Aesthetic Dimension**

Sustainable development education not only focuses on the acquisition of knowledge and skills, but also emphasizes the cultivation of values and emotional attitudes. (Guo,2023) points out that environmental and aesthetic education lacking emotional resonance is difficult to translate into real action. Aesthetic experience can help learners understand nature and society at the emotional level, thereby establishing an ethical connection between humans and the environment (Wang & Liu, 2024). Therefore, integrating aesthetic education into sustainable development education has become an important trend in international education.

In the field of photography, sustainable aesthetics does not pursue short-term visual stimulation, but emphasizes long-term values, cultural responsibility, and ecological awareness. In the creative process, photographers should not only consider the aesthetic appeal of the image, but also reflect on the impact of the image on social cognition and public sentiment (Li, 2022). This aesthetic orientation is continuous and responsible, and is an important connotation of sustainable visual awareness.

### **2.2 Visual Literacy and Photography Education**

Visual literacy refers to an individual's ability to understand, analyze, and apply visual information in the visual culture era, encompassing the complete cognitive process from perception to expression. Photographers are both producers and recipients of images. Photography education should enable photographers to understand the cultural attributes and social functions of images, fostering critical and reflective thinking in their creations, rather than merely pursuing formal effects (Xu & Wu, 2025).

Light, as a crucial component of visual language, is the cornerstone of visual literacy development (Xing, 2025). Through understanding and utilizing light, students not only master

techniques but also gradually develop aesthetic judgment and value selection abilities, laying the foundation for sustainable visual expression.

### **3. Lighting Types and Aesthetic Foundations in Film and Television Photography**

#### **3.1 Types of Light and Their Recognition**

The classification of light types is based on multiple criteria, and different types of light exhibit significant differences in their modeling effects and emotional transmission. This forms the foundation for teaching light modeling and cultivating students' aesthetic awareness (Zhang, 2014). Clearly defining the classification and characteristics of light helps students accurately grasp the modeling logic of light, providing theoretical support for flexibly using light to enhance the aesthetic value of images.

From the perspective of light source, light in film and television photography can be divided into two categories: natural light and artificial light (Hu *et al.*, 2025). Natural light is mostly used for outdoor shooting, possessing advantages such as high brightness and uniform distribution, creating a realistic and natural visual atmosphere. However, it is affected by factors such as time and weather, resulting in poor stability and variable light characteristics, placing high demands on the photographer's control (Zhao *et al.*, 2021). Artificial light is mainly used for indoor shooting. Although its illumination range is relatively limited, parameters such as brightness, angle, and color temperature can be manually adjusted to precisely create the desired lighting effect, providing photographers with greater creative space. It is an important tool for achieving personalized modeling and emotional expression in film and television photography (Yu, 2000). From an educational perspective, natural light training focuses on cultivating students' "aesthetic adaptation ability" (extracting aesthetics by conforming to the laws of light and shadow in the environment), while artificial light training focuses on "aesthetic creation ability" (actively controlling light to construct aesthetics). Together, they constitute the basic training dimension for sustainable aesthetic awareness.

#### **3.2 The Direction of Light and Emotion**

From the perspective of light source, lighting can be divided into various types such as front lighting, backlighting, side lighting, and side-backlighting. Different angles of light have distinct characteristics in shaping the image: front lighting evenly illuminates the subject, resulting in a soft and delicate image, but with weaker three-dimensionality; backlighting can outline the subject's contours, creating a sense of transparency and depth, enhancing the artistic tension of the image; side lighting, through contrast of light and shadow, shapes the subject's three-dimensionality and strengthens the spatial depth of the image, making it a commonly used lighting angle for portraying figures and creating atmosphere (Fu, 2008). Photographers need to combine narrative needs and aesthetic goals to rationally choose the lighting angle, achieving a harmonious unity between the image's form and emotional expression.

#### **3.3 Light Function and Vision**

Based on their function, light can be categorized into key light, fill light, ambient light, and accent light (Huang *et al.*, 2021). In actual shooting, a single light source is often insufficient to meet the compositional needs of the image; a combination of multiple types of light is required to achieve the desired effect. The key light is the core light source of the image, determining the overall lighting style, highlighting the subject, shaping the basic form, and is the only light source allowed to produce noticeable shadows. It is primarily used for outdoor natural light or indoor artificial light. Fill light, as a supplement to the key light, is mainly used to fill in shadow areas, reduce the contrast between light and dark areas, enhance image details

and depth, and ensure the integrity of the subject. Ambient light is used to render the atmosphere of the scene, highlight environmental features, and establish the emotional tone of the image; accent light focuses on optimizing local details, such as depicting individual strands of hair or clothing textures, enhancing the overall expressiveness of the image and strengthening the visual focus (Cao, 2015). Training in the combination of light and shadow is key to cultivating students' "aesthetic sense of hierarchy". By matching main and auxiliary lights and adding decorative lights, students are guided to understand the correspondence between "light and shadow hierarchy" and "emotional hierarchy", thus accumulating experience for sustainable aesthetic expression.

### 3.4 The Color and Aesthetics of Light

Based on color, light can be divided into three main categories: warm-toned light, cool-toned light, and neutral-toned light. The core difference lies in their color temperature, which in turn creates differentiated aesthetic expressions and emotional transmissions. This is an important component of the aesthetic system of light design (Liu & Zhang, 2022). In film and television photography aesthetic creation, single-tone light often struggles to achieve complex emotional expressions and create visual depth. A reasonable combination and harmonization of different tones of light are necessary to accurately convey narrative themes and enhance the aesthetic appeal and artistic tension of the image.

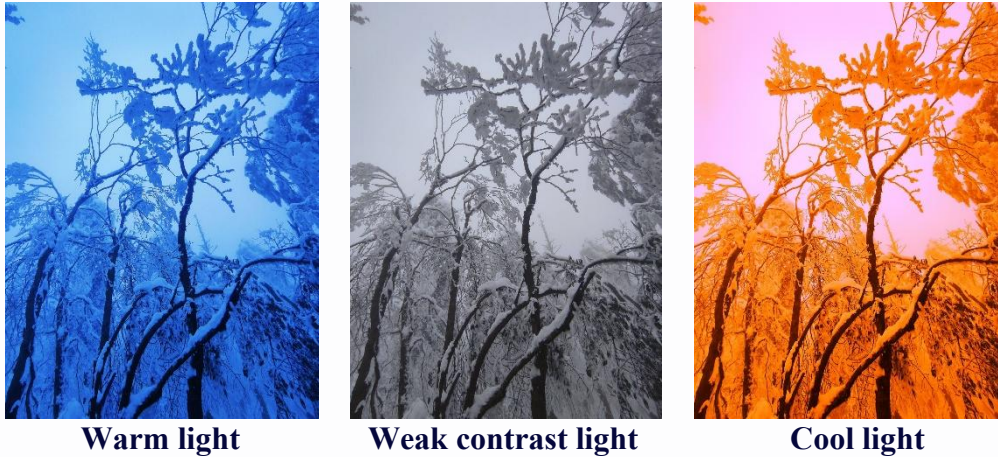
The aesthetic value of light color lies not only in the use of single tones but also in the combination and flexible harmonization of different tones. Common color combinations fall into two categories: contrasting combinations and harmonious combinations. Contrasting combinations use strong contrasts between warm and cool colors, such as the contrast between a cool background and warm clothing in a snow scene, to highlight the subject, enhance the layers of the image, convey conflict or emotional contrast, and increase the visual impact and aesthetic tension of the image. Harmonious combinations use color schemes of the same or adjacent color families, such as the harmony of warm yellow and orange-red, to create a unified and soft atmosphere, convey coherent and delicate emotions, and enhance the aesthetic comfort of the image. Training in the combination of light and color is key to cultivating students' "emotional aesthetic judgment." By guiding students to choose appropriate color tones and design reasonable color combinations in conjunction with the narrative theme, they can understand the correspondence between "color tone" and "emotional expression" and "aesthetic level," helping them establish an aesthetic mindset of "conveying emotions through color and expressing meaning through beauty," thus accumulating core experience for the formation of sustainable visual aesthetic awareness (Chenet *al.*, 2024).

## 4. Experimental Analysis of the Aesthetic Effectiveness of Light Design

To verify the impact of different lighting combinations on the visual aesthetic effect and audience perception of images, and to clarify the mechanism by which lighting design enhances visual aesthetics, this study designed two controlled experiments. Three groups of students were selected to photograph the same scene or character. General audiences and faculty members from the directing department were invited to participate in the evaluation. Qualitative analysis was used to extract the aesthetic efficacy of lighting design, providing data support and theoretical basis for teaching practice.

#### 4.1 The Aesthetic Expression and Psychological Suggestion Effect of Light Source Color

This experiment used the same scene as the subject. Three groups of students used warm-toned lighting, low-contrast lighting, and cool-toned lighting respectively for shooting. Audience evaluation was used to analyze the aesthetic effects and psychological impact of different colored lighting.



**Figure 1: Visual psychological perception of different light colors**

The first set of shots shot with warm-toned lighting received high praise from the audience for its outstanding visual aesthetic. General viewers commented that warm-toned lighting conveys feelings of warmth, comfort, and reassurance, creating a positive and uplifting atmosphere, seemingly infusing the images with vitality and guiding the audience to perceive the content with an optimistic mindset. Directing faculty members believe that warm-toned lighting possesses a delicate emotional expressiveness, accurately capturing subtle changes in a character's inner world, and concretizing implicit emotions through the interplay of light and shadow, enhancing the depth of emotional resonance in the image and allowing the audience to directly experience the character's emotional fluctuations and psychological journey.

The second set of shots shot with low-contrast lighting, with less contrast between light and dark and a weaker sense of three-dimensionality, presents a soft and understated aesthetic quality. General viewers stated that this type of lighting creates a tranquil and peaceful atmosphere, slowing down the narrative pace and allowing the audience sufficient time to appreciate the details of the images, providing a soothing visual experience, distinct from the aesthetic experience of strong visual impact, like a refreshing spring soothing the soul. Faculty members from the directing department pointed out that low-contrast lighting has a unique advantage in portraying characters' psychology, highlighting their vulnerability and strength, loneliness and longing, making the characters more realistic and bridging the psychological distance with the audience.

The third set of shots shot with cool-toned lighting conveys a somber, oppressive, and mysterious emotional tone. Ordinary viewers believe that cool-toned lighting veils the images with a profound mystery, creating an atmosphere of isolation, highlighting the characters' loneliness and confusion, enhancing the tension and appeal of the plot, and guiding the audience to delve deeper into the characters' inner secrets. Faculty members from the directing department emphasized that cool-toned lighting not only enhances the atmosphere but also carries themes of reflection and growth. Under the cool light, the characters' struggles and choices are more clearly revealed in terms of inner truth and resilience, bringing spiritual strength and enlightenment to the audience.

Experiment 1 results indicate that light and color, as important aesthetic carriers, possess three core functions: First, they portray character traits. Through variations in color warmth, coolness, brightness, and darkness, they simultaneously present the progression of a character's personality and emotions, enhancing the three-dimensionality and emotional impact of the character. For example, in “Natural Born Killers”, the director precisely depicts the protagonist's psychological fluctuations after committing murder through irregular changes in light and color, forming a unique artistic style (Wu et al., 2021). Second, they exert psychological suggestion. Light and color can accurately render the atmosphere of an environment, and combined with elements such as time and place, guide the audience to generate corresponding emotional responses, achieving positive emotional transmission (McDonnell et al., 2025). Third, they enhance the level of visual aesthetics. Through color contrast and harmony, they enhance the artistic expression of the image, bringing a rich visual experience to the audience (Mat Bouly, 2022). The implications of these results for teaching are that "group training in color and light" can allow students to intuitively experience the connection between color and emotion and narrative, breaking away from the mindset of "technical parameter adjustment" and cultivating an "aesthetically oriented" ability to use light, aligning with the goal of cultivating sustainable visual aesthetic awareness.

#### 4.2 The modeling effects and aesthetic value of different lighting

directions: This experiment used the same character as the subject. Three groups of students used three different lighting methods: single main light, main light and fill light combination, and main light + rim light + decorative light combination. The modeling effects and aesthetic value of different lighting combinations were analyzed. (*The image is a portrait of the 1<sup>st</sup> author himself*)



**Figure 2: The shaping effect of light from different directions**

The first set of shots, illuminated solely by a key light, highlights the subject, enhances three-dimensionality, and provides clear visual guidance. General audience feedback indicates that the key light, as the core light source, precisely illuminates the subject, constructs visual layers through contrast, guides the audience to focus on key elements, and enhances the narrative and expressiveness of the image. Directing faculty believe that the key light gives the image its soul, clearly outlining character contours and showcasing expressions and movements, while also conveying the director's intentions through variations in brightness and color, creating a corresponding emotional atmosphere, and achieving a dual effect of visual experience and emotional resonance.

The second set of shots, illuminated by a combination of key and fill light, exhibits moderate contrast and rich detail, presenting a delicate and realistic aesthetic effect. General audience feedback indicates that the fill light fills in the shadows created by the key light, making the image balanced and complete, clearly capturing details such as character expressions and clothing textures, enhancing the realism and spatial sense of the image. Directing faculty points out that the synergy between the fill and key lights not only optimizes the visual effect but also deepens emotional expression, creating a suitable atmosphere through soft light and shadow transitions, and enhancing the audience's emotional engagement.

The third group of lighting combinations—key light, rim light, and decorative light—creates a highly three-dimensional and spatial effect, combining decorative and layered qualities. Ordinary viewers believe that this lighting combination, through precise contrast of light and shadow, highlights facial details and contours, enhancing the mystery and artistic tension of the image, while guiding the audience's attention to core elements and deepening their understanding of the narrative theme. Directing faculty emphasize that multiple lighting combinations can achieve more nuanced emotional delivery and atmosphere creation. Adjusting the intensity and angle of light according to the needs of the plot can create diverse emotional expressions, making character portrayals more complete and the narrative more impactful.

Experiment 2 results show that different combinations of light from different directions and with different functions have differentiated aesthetic values: the main light, as the core element of the design, determines the overall style of the image and is the foundation for achieving synergy between narrative and aesthetics; it needs to be precisely controlled according to the shooting scene and the needs of the character. Fill light can compensate for the shortcomings of the main light, optimize image details and layers, and enhance the realism and comfort of the image; it is key to balancing visual effects and emotional expression. Rim light and decorative light focus on local optimization, enhancing the spatial depth and artistic expression of the image, and helping to achieve personalized visual aesthetic expression.

For example, in the film *The Long March*, the cinematographer skillfully used rim light to highlight the towering figure and strengthen the theme of the work. Based on this, teaching can design "advanced training in light combination," gradually guiding students to understand the unity of "light combination logic" and "aesthetic expression logic" from the use of single light to the synergy of multiple light sources. This cultivates their ability to independently optimize lighting schemes in complex scenes, providing practical support for the construction of sustainable visual aesthetic awareness.

## **5. Strategies for Cultivating Sustainable Visual Aesthetic Awareness Using Light as a Catalyst**

Based on the above experimental analysis, light modeling, as a core catalyst for enhancing visual aesthetics, needs to be applied in teaching to cultivate students' sustainable visual aesthetic awareness, break through the limitations of traditional teaching, and construct a teaching system that deeply integrates theory and practice. Combining the realities of film and television photography teaching, the following four teaching strategies are proposed:

i. Transforming Teaching Concepts and Constructing an "Aesthetically Oriented" Teaching System

Traditional film and television photography teaching suffers from limitations of "emphasizing theory over practice" and "emphasizing technique over aesthetics," making it difficult to meet the needs of cultivating students' sustainable visual aesthetic awareness. Therefore, innovation is needed in both teaching concepts and curriculum design: First, optimize the curriculum system, setting tiered teaching objectives for students of different grades. Lower grades should focus on imparting basic photographic knowledge and light modeling techniques, solidifying students' technical foundation through basic training; higher grades should emphasize the aesthetic application and innovative practice of light modeling, guiding students to achieve personalized use of light in conjunction with narrative needs. Second, adjust the teaching ratio, rationally allocate theoretical and practical class hours, and strengthen the connection and integration between the two. For example, after explaining theoretical knowledge such as exposure control and light classification, timely arrange corresponding practical courses. Through group cooperation, demonstrations, and error correction guidance, students can consolidate their knowledge and improve their skills in practice. Third, expand the teaching content by adding supplementary courses such as art appreciation and light and shadow aesthetics. Guide students to learn from the light and shadow layout experience of painting masters, improve their aesthetic cognition level, and lay the foundation for the formation of sustainable visual aesthetic awareness (Barnett-Itzhaki et al., 2025; UNESCO, 2021).

ii. Strengthen the control of light atmosphere and enhance aesthetic expression ability.

Precise control of light atmosphere is the core of realizing the aesthetic value of light and the key to cultivating students' sustainable visual aesthetic awareness. Teaching should focus on guiding students to master the techniques of controlling light atmosphere: First, based on practical scenarios, let students understand the impact of lighting on the texture of the picture. Whether using natural light or artificial light, it is necessary to combine the needs of the picture's form and the narrative theme, and rationally adjust the brightness, angle, and color of the light to ensure the synergistic unity between the aesthetic effect of the picture and the theme expression. Secondly, drawing on classic art, students are guided to delve into the works of masters such as Rembrandt and Vermeer, learning their techniques for controlling immersive light sources and the contrast of light and shadow. For example, Vermeer's use of candlelight and sunlight provides aesthetic references for light modeling, helping students achieve a visual aesthetic expression that is "derived from life but transcends life" (Jones, 2024). Thirdly, a problem-oriented approach is emphasized, addressing common issues in photography such as shadows and ghosting, guiding students to solve these problems through lighting design and light combinations, thereby enhancing the texture and aesthetic level of the image (Davis et al., 2023).

iii. Streamlining Lighting Fixtures and Practicing the "Simple and Efficient"

Design Concept Early film and television shooting relied heavily on numerous lighting fixtures due to technological limitations, resulting in excessive stray light that negatively impacted the subject's expressiveness. With advancements in photographic technology, streamlining lighting fixtures and pursuing simple and efficient lighting design has become a crucial trend for enhancing the aesthetic quality of images. In teaching, this concept should be conveyed to students in the following ways: First, emphasize "less is more," guiding students to create a soft and delicate image texture through the use of single or small combinations of lighting fixtures, combined with natural light effects such as reflected and diffused light.

For example, in the film *Breathless*, the cinematographer cleverly used reflected light to avoid harsh shadows caused by direct lighting, enhancing the artistic expression of the image.

Second, differentiate between image types, clarifying the differences in lighting between color and black-and-white films. Color films can distinguish image elements through the contrast of colors themselves, while black-and-white films require variations in light intensity to create tonal gradations, cultivating students' ability to flexibly use light for different scenes. Third, standardize lighting logic. If multiple lighting fixtures are used, ensure the light source direction is consistent to avoid stray light interference, achieving a simple, efficient, and aesthetically unified lighting design. The core of this strategy is to cultivate students' aesthetic judgment of "eliminating redundancy and grasping the essence," freeing them from excessive reliance on equipment and teaching them to discover aesthetic value from the light itself. This is the core characteristic of sustainable visual aesthetic awareness.

#### iv. Flexibly Utilizing Light Source Color Temperature to Enhance Emotional Aesthetic Expression

As a core attribute of light color, light source color temperature directly affects the emotional tone and aesthetic effect of the image, and is an important vehicle for cultivating students' emotional aesthetic expression ability. In teaching, students need to be guided to accurately grasp the application techniques of light source color temperature: First, clarify the emotional connotation of color temperature, enabling students to grasp the differences in aesthetic expression between warm and cool tones. Warm tones convey warmth, weight, and fullness, while cool tones create a quiet, ethereal, and oppressive atmosphere. Appropriate color temperatures should be selected based on the narrative theme and the characters' psychology. Second, strengthen practical training, guiding students to achieve progressive emotional expression through color temperature contrast. For example, when shooting winter scenes, the contrast between the cool tones of the vast snowscape and the warm tones emanating from the windows of houses not only showcases the scene's characteristics but also conveys a warm emotional core, enhancing the aesthetic appeal of the image. Third, select equipment reasonably and choose the corresponding lighting equipment according to the needs of the shooting scene. For example, HBS lamps are suitable for scenes with large-area lighting and high color rendering requirements, while incandescent lamps are suitable for creating a warm light atmosphere in interior scenes. This allows students to master the application logic of different equipment in practice and improve the flexibility of light modeling and aesthetic expression.

## 6. Conclusions

### 6.1 Main conclusions

This study uses light as a core catalyst for enhancing visual aesthetics. Through experimental analysis and the construction of teaching strategies, it explores the application path and practical value of light modeling in the education of sustainable visual aesthetic awareness among film and television photographers. The research shows that the type, color, direction, and combination of light have a significant impact on the visual effect, emotional transmission, and audience psychology. Light is not only a core technical means in film and television photography but also an important vehicle for achieving visual aesthetic expression and cultivating sustainable aesthetic awareness. By transforming teaching concepts, strengthening the control of lighting atmosphere, simplifying the use of lighting equipment, and flexibly applying the color temperature of light sources, the teaching effect of film and television photography can be effectively optimized, helping students master the aesthetic principles of light modeling, achieving a leap from technical application to aesthetic innovation, and ultimately forming a sustainable visual aesthetic awareness.

## 6.2 Limitations of the study

While this study has significant practical implications for film and television photography education institutions, breaking away from the traditional technology-oriented teaching model and constructing a teaching system "centered on light and guided by aesthetics," demonstrating that the aesthetic appeal and narrative function of film and television visuals can be synergistically cultivated through systematic teaching, the study also has certain limitations. For example, the experimental sample size is limited, and future studies could expand the sample size and incorporate quantitative research methods to further verify the actual effectiveness of light-based visual design instruction. Furthermore, there is insufficient long-term follow-up research on "sustainable visual aesthetic awareness," which could be verified by tracking the industry performance of graduates to validate the long-term effectiveness of the teaching strategies.

## 6.3 Future Research Direction

In the future, with the continuous development of film and television technology and the increasing aesthetic demands of audiences, the aesthetic value of light modeling will become even more prominent. Film and television photography education needs to continuously monitor the innovative developments in lighting techniques, strengthen interdisciplinary integration, and combine lighting design with new media technologies and digital art to explore more novel teaching methods and creative forms. At the same time, it is essential to focus on cultivating students' individual aesthetic abilities, guiding them to develop unique aesthetic styles based on a grasp of the principles of lighting design, thus supplying the film and television arts with well-rounded talents who possess both technical skills and aesthetic literacy.

## Acknowledgment

The author would like to express their heartfelt thanks and gratitude to UNITAR International University for their invaluable support

## Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this study.

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