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Research on the Development of Aesthetic Education for Chinese Adolescents Using Traditional Animation Colors

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Abstract: Through literature review and data analysis, this study examines the impact of traditional Chinese animation colors on adolescents' cognitive abilities. Specific research scope: color composition elements in traditional Chinese 2D animated imagery (1926-2023), adolescent cognitive abilities (11-15 years, 15-19 years, 19-25 years), and dialectical connections between cognitive and color content. This study analyzes the impact of watching animated films on children's color perception abilities through experiments conducted on adolescents aged 11-15, 15-19, and 19-25. Although the Chinese government has designated the animation industry as a strategic national sector and actively supports it, creators must consider its impact on teenagers when producing it to ensure its long-term development. Animation, as an art form that blends multiple artistic forms and academic fields, plays a crucial role in the cognitive development of adolescents. Therefore, this study aims to analyze the impact of watching animations on adolescents' color cognition abilities by investigating the differences in color cognition between teenagers who watch animations and those who do not.

1. Introduction

The 12th Central Committee's Third Plenary Session noted that China's modernization is a harmonious modernization of both material and spiritual civilizations. We must enhance cultural confidence, develop advanced socialist culture, promote revolutionary culture, and preserve China's excellent traditional culture. Traditional Chinese animation colors play an extremely important role in the development of animation in China, primarily through three parts: the classification of color lineages in visual perception, natural analysis of Chinese animation colors, and exploration of symbolic representation of color features in different regions.

2. Research on Scope and Methods

The study involved 300 adolescents (aged 11-15, 15-19, and 19-25, each 100 in every age group) who used WPPSI and CUCCI tests to pre-assess their color cognition abilities and re-evaluated

them after watching animations once, twice, and three times to investigate the impact of animation viewing. The data analysis method employs independent sample t-tests, paired sample t-tests, and repeated measurement variance analysis (ANOVA).

The study results show that, first, adolescents' observational and attentional abilities significantly improve with repeated watching of animated films. Second, measurements of adolescents' observational and attentional abilities across age groups showed that adolescents aged 11-15 experienced the lowest improvement under various viewing conditions. Third, watching animated films more than twice has the greatest effect on enhancing teenagers' color perception abilities. Fourth, 11-15 year-olds enhance their color distinction through simple color contrast content, 15-19 year-olds further develop their color perception skills through complex color combinations and details, and 19-25 year-olds develop advanced color cognition and observation abilities through more detailed content, as shown in Figure 1, Figure 2.

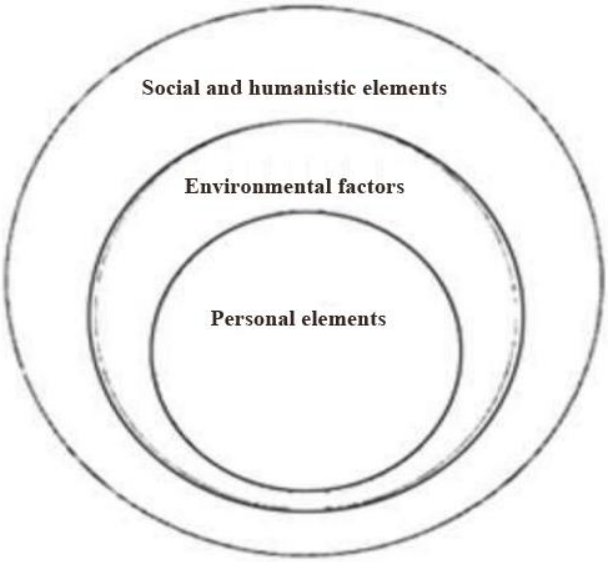

Figure 1: Visual Sensory Elements of Color

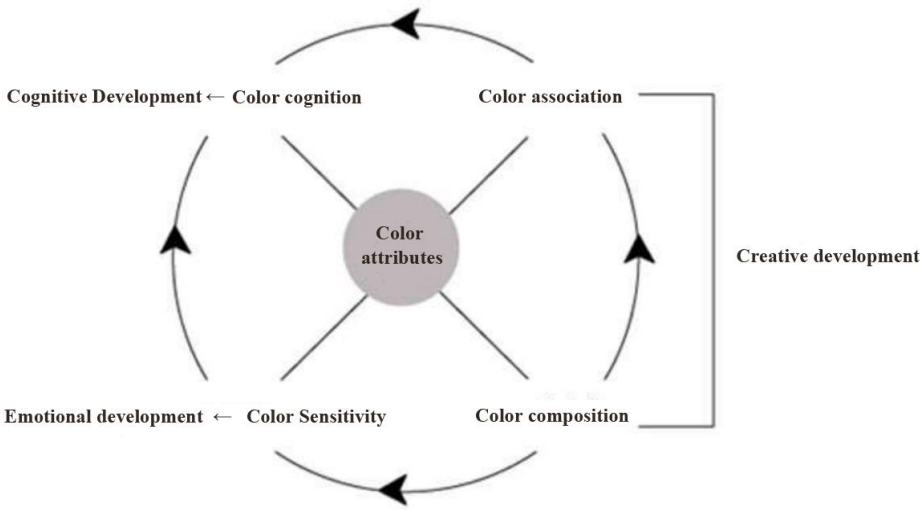

Figure 2: The Relationship between Color and Adolescent Growth

2.1. Background of the study area

In recent years, animations adapted from traditional Chinese mythology have injected new vitality into the Chinese animation market. The Chinese animation industry has a long history but has undergone rapid development and change in modern times. Chinese animation originated at the beginning of the 20th century, with most of its works based on traditional Chinese culture and mythology. This tradition continues to this day, with many animations based on China's unique culture and history. Especially, the 2012 re-released animated film "The Chaos in Heaven" is a successful modern interpretation of this tradition. The film reconstructs the traditional Chinese myth "Journey to the West" with a modern feel, achieving tremendous success. The 2012 film "The Chaos in Heaven" is a remaster of the animated series "The Chaos in Heaven" from 1961 to 1964, adjusting the original storyline to 88 minutes and converting the narrow-screen ratio to widescreen, offering a new visual experience. In 2012, "The Chaos in Heaven" won the Outstanding Contribution Award in the animation department at the 32nd Hawaii International Film Festival and was recognized internationally, significantly boosting confidence in China's animation community. Additionally, "The Chaos in Heaven" received praise from various age groups both domestically and internationally in 2012, contributing to the popularization of Chinese animation.

Animation is a unique and rich art form that blends various artistic forms and disciplines. It is based on artistic elements such as painting, drama, aesthetics, and photography, combined with academic content in literature, history, and geography, and is created in this manner. Due to this characteristic, animation is not just a form of entertainment but also a powerful medium for conveying cultural and educational values. Animation creates visually appealing images through the of painting and art, leaving a deep impression on the audience. By introducing dramatic elements, make the characters' actions and expressions lively, and enhance the story's immersion through scene transitions and performance techniques. Furthermore, animation imbues the work with realism by employing photography techniques and enriches its worldview through detailed background descriptions. Moreover, animation creates profound stories and characters through literary elements. Stories and dialogues based on literary imagination evoke emotions and lessons for audiences, adding realism to the work through historical and geographical contexts. This is not only a form of entertainment but also valuable for educational content, serving as an interesting and easy-to-understand tool to disseminate various academic knowledge. Animation still plays an important role in adolescent growth. It sparks teenagers' imagination, fosters creative thinking, and conveys social values and moral lessons. The various characters and stories in the animation offer teenagers new experiences by developing problem-solving skills through situations that differ from those in the real world. For example, brave and fearless protagonist adventure stories instill a spirit of challenge in teenagers, while stories of overcoming difficulties through collaboration with friends raise awareness of the importance of social interaction. Furthermore, animation promotes the emotional development of teenagers through emotional resonance and empathy. Through the conflicts and resolution processes experienced by the protagonist, teenagers learn emotional regulation skills and develop the ability to understand others' emotions. This emotional development plays a crucial role in shaping and maintaining social relationships among adolescents. In this way, animation combines artistic, academic, and educational elements to become an important medium for promoting the cognitive development of teenagers. Through this, animation transcends mere entertainment and encompasses multiple meanings and functions[1-2].

Studying the impact of animation viewing on adolescents' color cognition is a necessary factor for understanding and supporting their overall cognitive and emotional development. This can provide a basis for academic fields related to youth education, media production, and practical decisions made by parents and educators. Therefore, this study aims to analyze the impact of animation viewing on adolescents' color cognition abilities. Specifically, by investigating animation

views, viewing times, color exposure levels, and the differences in color cognition between watching and not watching animations, this study explores the impact of animation viewing on the color cognition development of adolescents aged 11-15, 15-19, and 19-25.

2.2. Adolescents' color cognition abilities

Humans perceive and understand things through their eyes and respond to them in various ways. Especially, color is a crucial concern for growing teenagers, closely related to their personality, intelligence, and maturity, and is therefore considered a very important factor in assessing adolescent development. However, understanding the development of the concept of color is not simple. Concepts are closely related to language, especially as vocabulary plays a crucial role in expressing specific concepts. Chen Yingzhi (2015) noted that adolescents often have limited language expression abilities compared to adults, and they tend to express emotions recognized through experience by immediately choosing and using colors. This is a way for teenagers to express the stimuli they receive from their external environment and their psychological impacts by choosing specific colors, thereby reflecting their emotional state, caregiving conditions, or current psychological needs.As shown in Table 1.

Formal Operational Stage: Ages 11 and above

During the formal operational stage, teenagers can engage in abstract and hypothetical thinking. According to Sin et al. (1998) Research shows that adolescents entering the formal operational stage can understand abstract concepts, propose hypotheses, and engage in logical thinking, which significantly enhances their scientific thinking and problem-solving abilities. Teenagers can consider various possibilities and systematically solve problems[3-4].

Table 1: Research and Content on Adolescent Color Cognitive Abilities

Researchers	Content
Lowenfeld (1987)	Children's perception and use of colors change with age and developmental stage. In the early stages, children simply recognize colors and develop basic preferences for them. As time progresses, children begin to use colors more finely and gradually understand their symbolic meanings and emotional expressions.
Lee Yeonsook,Oh Seunghye,Lee Euijun (1985)	The study examined the extent to which children remember and use color names, as well as the transformation process of matching color names with actual colors.
Kim Jeong (1985)	Explain the importance of art education in children's development, emphasizing the positive impacts of art on their creativity, emotional expression, and cognitive development.
Lowenfeld and Brittain (2002)	Explain how children's and adolescents' artistic expressions change with age and developmental stage, and argue that teachers should adopt appropriate art education methods based on students' developmental levels.
Lee Gyurim (2017)	Asserting that color education plays a crucial role in children's overall development, particularly in terms of creativity, emotional expression, and cognitive development.

2.3. Equations

This study selects the colors of animated characters as stimuli to explore the impact of watching animations on color cognition among teenagers. For this reason, we selected adolescents (aged

11-15, 15-19, and 19-25) based on Piaget's cognitive development stages and measured their color cognitive abilities by dividing them into attention and observational skills that affect visual perception. The experimental method first measures adolescents' cognitive abilities before watching animations, and then assesses changes in cognitive abilities among adolescents across three age groups based on the number of times they watch animations (1 time, 2 times, 3 times). Views were measured once, twice, and three times. The first viewing measured the teenagers' color cognition abilities, the second viewing took place the next day and was measured again, and the third viewing was conducted and measured the day after the second viewing[5]. The measurement methods include simultaneously using WPPSI to assess observational abilities and Mr. CUCUI's experiment to measure attention, thereby evaluating adolescents' color cognition skills. The study sample consists of four types of animated characters, with independent variables being the number of times animations viewed and subordinate variables being the degree to which adolescents' color cognition abilities (attention and observational skills) change. Control variables include age and gender differences among adolescents, as shown in Table 2.

Table 2: Research Model

Assume	Analysis Content	Analytical Method
H1	Watching animations (repetitions) can have a positive impact on teenagers' observational skills.	Independent sample t-validation - Corresponding sample t-validation - Repetitive measurement method Difference analysis (ANOVA)
H2	Watching animations (repetitions) can have a positive impact on teenagers' attention.	
H3	The age of teenagers can have a positive impact on their observational skills.	
H4	The age of teenagers can have a positive impact on their attention.	
H5	The gender of teenagers can have a positive impact on their observational skills.	
H6	The gender of teenagers can have a positive impact on their attention.	
H7	The colors of animated characters can have a positive impact on their observational skills.	
H8	The colors of animated characters can have a positive impact on attention.	

3. Conclusions

This study aims to explore the impact of animation viewing on the cognitive abilities of adolescents aged 11-15, 15-19, and 19-25. The visual perception of character colors among teenagers was measured at different viewing times. The measurement variables are divided into four conditions: no viewing, no viewing once, no viewing twice, and no viewing three times, based on changes in whether and no viewing occurrences are measured.

First, an independent sample t-test was conducted to confirm adolescents' cognitive abilities before and after watching the animation. Subsequently, after the experimental processing, a paired sample t-test was conducted to confirm whether there was statistically significant difference in scores among adolescents in each cognitive ability. Finally, to understand the improvement in color perception due to viewing frequency, a repeated measurement variance analysis (ANOVA) was conducted, as shown in Table 3, Table 4, Table 5, Table 6.

Table 3: Statistics on Missing Color Techniques

Watch	Frequency(N)	Average	Standard deviation	Minimum value	Maximum value
Not watched(A)	300	13.61	2.34	8.00	17.00
1 time (B)	300	17.00	3.03	11.00	24.00
2 time (C)	300	21.63	3.97	14.00	27.00
3 time (D)	300	26.91	4.07	17.00	34.00

Table 4: Analysis Results for Missing Colors

Watch	BBSW score(Mean±SD	F	p-value	Post-event analysis
Not watched(A)	13.61(±2.34)	1095.2***	.000	A< B< C< D
1 time (B)	17.00(±3.03)			
2 time (C)	21.63(±3.97)			
3 time (D)	26.91(±4.07)			

***p<.001

Table 5: Statistics on Color Techniques for Finding Replacements

Watch	Frequency(N)	Average	Standard deviation	Minimum value	Maximum value
Not watched(A)	300	16.85	3.27	9.00	23.00
1 time (B)	300	20.02	2.78	14.00	26.00
2 time (C)	300	26.43	4.11	17.00	33.00
3 time (D)	300	30.53	2.17	23.00	33.00

Table 6: Analysis Results of Replaced Colors

Watch	BBSW score(Mean±SD	F	p-value	Post-event analysis
Not watched(A)	16.85(±3.27)	84512.96***	.000	A< B< C< D
1 time (B)	20.02(±2.78)			
2 time (C)	26.43(±4.11)			
3 time (D)	30.53(±2.17)			

***p<.001

This study aims to comprehensively understand how animation viewing affects preschool children's color cognition abilities and to reveal key factors behind it.

Firstly, repeated viewing of animations has a positive impact on enhancing teenagers' color cognition abilities.

Next, teenagers can achieve the same level of color cognition as adults by continuously watching animations.

Third, during animation viewing, the gender of teenagers does not affect their ability to perceive colors.

Based on the above research findings, the characteristics of color cognition abilities in adolescents can be summarized as follows:

Firstly, regarding the characteristics of observational skills, adolescents aged 11-15 have weaker attention to detail and lower color memory and perception abilities. Therefore, teenagers can develop color distinction skills by watching animations with simple color contrasts, and repeated color exposure can enhance their memory and perception of colors, which helps develop early color cognition abilities. Teens aged 15-19 tend to have higher color observation skills, better detailed memory, and stronger information processing abilities. However, they can further develop their

color observation skills through complex color combinations and detailed character design. During this stage, teenagers can benefit from animations that include various colors and details due to improved memory and processing abilities, enhancing their information processing skills and helping them understand more complex visual information. Teens aged 19-25 exhibit strong performance in fixed color recognition, accurately remembering details and quickly processing information. Teens aged 19-25 can further develop their fine-grained color cognition and observational skills through animations that include complex colors and intricate details. Due to their ability to quickly process information, they can effectively identify rapidly changing colors and scenes.

Next, regarding the characteristics of attention, while 11-15 year-old teenagers can understand the symbolic meanings of colors, they tend to have weaker selective and sustained attention. Teens aged 15-19 can understand the symbolic meanings of colors and perform quickly in classification and sorting, showing high selective attention but low sustained attention. Teens aged 19-25 can understand the symbolic meanings of colors, exhibit high levels of selectivity, and maintain sustained attention due to the development of logical thinking skills.

Third, the number of times animations are viewed has a positive impact on adolescents' observational skills and attention improvement. The study findings indicate that repeated viewing more than twice significantly enhances adolescents' color cognition abilities, as it enables them to better remember and process color-related information. Therefore, educational animations should be recommended to be watched multiple times rather than just once.

Fourth, providing age-appropriate animated content is crucial for supporting adolescents' cognitive development.

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