International Journal of Evaluation and Research in Education (IJERE)
Vol. 13, No. 6, December 2024, pp. 3696~3704
ISSN: 2252-8822, DOI: 10.11591/ijere.v13i6.29961

Effects of environmental art perception on students' creativity and emotional development

Yuanyuan Sun, Shunli Liu
International College, Krirk University, Bangkok, Thailand

Article Info

Article history:

Received Jan 16, 2024
Revised Apr 26, 2024
Accepted May 7, 2024

Keywords:

Art education
Chinese students
Creativity
Emotional development
Environmental art perception

ABSTRACT

Addressing the gap in understanding how environmental art perception (EAP) and emotional development (ED) influence creativity among fine arts college students, this study focuses on their interrelations in China's Henan Province. The objective is to investigate the effects of EAP and ED on creativity within this demographic. Employing a survey method, the study gathered data from 585 students across comprehensive art colleges in Henan Province, analyzing the impact of campus art design on creativity and the mediating role of ED. The findings reveal that EAP significantly enhances creativity, with campus art design playing a crucial role. Furthermore, ED serves as an essential mediator, fostering creativity through improved emotional awareness, expression, and management. Based on these insights, the study recommends educational strategies that integrate ED with the cultivation of creative thinking. Such approaches aim to nurture art professionals who not only excel in creativity but also in emotional intelligence, emphasizing the need to optimize environmental art exposure and focus on emotional skills in art education.

Corresponding Author:

Yuanyuan Sun
International College, Krirk University
No. 3 Soi Ramintra 1, Anusawari Subdistrict, Bang Khen District, Bangkok 10220, Thailand
Email: 59419127@qq.com

1. INTRODUCTION

In contemporary society, education is no longer limited to imparting knowledge but emphasizes the cultivation of students' comprehensive abilities and competencies [1]. Creativity [2] and emotional development (ED) [3] are considered two crucial aspects of these competencies. Creativity is not only key to problem-solving, innovation, and development but also a core capability for individual growth and self-realization [4]. Emotional intelligence enables students to better understand themselves and others, build positive relationships, and cope with emotional distress and setbacks more effectively [5]. Therefore, one of the goals of education is to foster students' creativity and ED to help them better face future challenges [6].

Art education, as an effective means to cultivate creativity and ED, has gained widespread recognition [7]. Art education encompasses not only visual arts, music, drama, and dance but also includes environmental art perception (EAP) [8]. EAP is a multidisciplinary field that combines art with the interaction of environment, space, and society, creatively improving and enriching people's living environments [9]. One of the core concepts of EAP is integrating art into people's daily lives to enhance their aesthetic experiences and inspire creativity [10].

Environmental art perception has a unique impact on students' creativity [11] and ED [12]. Robinson *et al*. [13] argued that through participating in EAP projects, students can personally experience the process of artistic creation and learn creative thinking and problem-solving skills. Furthermore, research by

Gu and Hirai [14] found that the spatial design of art museum exhibitions positively influences audience emotions. Therefore, EAP emphasizes emotions and emotional expression, helping students better understand and express their emotions, fostering emotional intelligence [15].

However, despite the enormous potential of EAP in art education, it still faces challenges and controversies [16]. Berleant [17] suggests that environmental art places too much emphasis on practice and application, neglecting the intrinsic value of art itself. Additionally, some schools and educational institutions may lack sufficient resources and support to conduct environmental art design projects [18]. Therefore, there is a need to delve into the actual impact of EAP on students' creativity and ED, as well as how to overcome related challenges and obstacles.

This research targets the overlooked impact of EAP on student creativity and ED, a niche yet significant aspect of art education. While previous studies broadly recognize art's educational benefits, they often miss how environmental art specifically fosters creativity and emotional intelligence [10], [11]. This investigation aims to shed light on the direct influence of environmental art on these key student attributes. It addresses the scant attention given to environmental art's unique role and challenges within art education literature, offering insights into its integration for enhancing student experiences. By exploring environmental art's specific impacts, this study contributes novel perspectives to art education, emphasizing its vital role in developing essential student competencies for future challenges. Therefore, the following four research questions (RQ) are proposed: i) how does EAP affect the creativity of art college students? (RQ1); ii) how does EAP affect the ED of art college students? (RQ2); iii) how does the ED of art college students affect their creativity? (RQ3); and iv) what is the relationship between the ED of art college students and their perception of environmental art and creativity? (RQ4).

2. LITERATURE REVIEW

2.1. Theory of emotional development

The theory of ED, proposed by American psychologist Erikson [19], focuses on the study of the developmental process of individual emotional experiences, emotional expression, and emotional intelligence. It emphasizes the significance of human ED, particularly highlighting the emotions and psychological challenges individuals experience at different stages of life. The theory posits that emotions are an indispensable part of human life, playing a crucial role in individual psychological well-being and social interactions [20]. The theory of ED underscores that emotions are not fixed and unchangeable but can be cultivated and developed through education and social experiences [21].

This paper contends that the theory of ED emphasizes the importance of emotional intelligence. EAP design can cultivate college students' emotional intelligence through emotional experiences and stimuli. For instance, appreciating works of art can stimulate individuals' sensitivity and understanding of emotions, aiding them in better identifying, expressing, and handling emotions, thereby enhancing emotional intelligence. Furthermore, emotional expression is a key aspect of the theory of ED. EAP design can provide rich opportunities for emotional expression. Through the creation and appreciation of artistic works, individuals can express their emotions through artistic activities, contributing to emotional expression and development. Improved emotional expression may impact creativity, as individuals can more freely express their creativity and emotions. Additionally, emotional resonance is an important concept in the theory of ED. EAP design can prompt individuals to resonate emotionally with artistic works and others. This emotional resonance can strengthen individuals' emotional connections with others, aid in building closer social networks, contribute to ED, and may be related to the development of creativity, as emotional resonance with others can inspire innovation and creative thinking.

2.2. Environmental art perception and creativity

Creativity is a multidimensional cognitive ability that holds particular importance in the field of art [11]. The design of EAP focuses on creating a unique sensory experience in specific environments. Through sensory elements such as vision, hearing, touch, smell, and taste, artists can convey their creativity and emotions [22]. For individuals, unique sensory experiences provide creative stimuli. When individuals perceive the artistic attributes within their environment, they contemplate how to express themselves in different ways, creating novel artistic works that contribute to the cultivation of imagination and the stimulation of creative thinking.

Environments with artistic characteristics, such as architecture, can offer students a more diverse and enriching range of creative materials [23]. In such environments, students can not only observe visually but also experience sounds, touch materials, and even taste and smell different odors. This multisensory experience enhances students' sensitivity to various sensory inputs, helping them better understand and utilize the diversity of sensory elements to express their creativity [24]. Yu [25] suggests that environments with artistic attributes in design emphasize the expression of emotions, a key aspect of creativity. Creative works

often carry emotions and emotional experiences, and through the artistic inspiration from the external environment, individuals can learn to transform emotions into artistic creations, contributing to more expressive and impactful creations.

Stimulation of emotions is crucial for inspiring creativity [26]. Environmental art often achieves its artistic purposes by triggering emotional responses from the audience. For example, Sommer *et al*. [27] designed an "immersive art pollutant chamber" based on knowledge from environmental psychology, experiential aesthetics, and radical art. The conclusion drawn from a survey of 2,662 visitors was that environmental art is useful for environmental communication and provides recommendations for communicators on how to best utilize it. We emphasize the potential benefits of art in encouraging individual responsibility and the need for effective behavioral measures in environmental psychology research. In summary, this paper proposes the following hypothesis: EAP positively influences the creativity of art students (H1).

2.3. Environmental art perception and emotional development

Environmental art is a form of art that emphasizes perception and interaction, often creating a unique sensory experience in specific environments. This art form places the audience in a carefully designed environment, conveying the artist's creativity and emotions through senses such as vision, hearing, touch, smell, and taste. For art students, engaging in EAP is not only a creative experience but also has profound effects on their ED [28].

One of the core objectives of environmental art is to evoke emotional experiences in the audience, stimulating their emotions through visual, auditory, tactile, and other sensory elements. When designing these environments, artists often consider how to evoke different emotions such as pleasure, excitement, calmness, and contemplation [29]. Emotional expression is a key aspect of ED, and art encourages audiences to transform their emotional responses into expressive forms [20].

Environmental art often incorporates various emotional elements, sometimes evoking joy and excitement, other times fostering contemplation and introspection [30]. In such environments, individuals can encounter and explore different types of emotions, even the complexity of emotions. This helps the audience better understand the diversity of emotions, recognizing that emotions are not singular and static but dynamic and multi-layered. For example, scholars like Higuera-Trujillo *et al*. [31] study human cognitive and emotional responses to architectural environments, demonstrating that architectural environments can effectively influence human emotions. In summary, this paper proposes the following hypothesis: EAP positively influences the ED of art students (H2).

2.4. Emotional development and creativity

Emotional development involves the growth and progress of individuals in terms of emotions and emotional intelligence, with profound implications for the creativity of art students [6]. Creativity is a multidimensional cognitive ability that includes aspects such as imagination, innovative thinking, and problem-solving, and ED can stimulate and enhance these key elements of creativity. ED can inspire creative thinking [32]. When individuals experience and understand various emotions, they are more likely to generate new ideas and creativity. Emotional experiences can serve as a source of inspiration for creativity, as emotions often trigger profound reflections and expressions.

Emotional development contributes to improving emotional awareness, i.e., a better understanding and recognition of one's own and others' emotional states [33]. Emotional awareness is foundational to creativity, as it allows individuals to more profoundly understand the impact of emotions on thinking and behavior. ED fosters emotional expression, and emotional expression is at the core of creativity [34]. Through mediums such as art, music, dance, and drama, art students can transform their emotions into creative works. This emotional expression not only helps them better understand and express themselves but also stimulates creative thinking. Emotional expression involves a bidirectional relationship between ED and creativity, as it contributes to cultivating emotional intelligence while also promoting creative expression.

Emotional management is a part of ED, involving how individuals understand and handle emotions [35]. On one hand, this can assist art students in better managing emotional fluctuations during the creative process to maintain the coherence of their work. On the other hand, emotional management also helps maintain a positive emotional state when facing setbacks and difficulties, which is crucial for the development of creativity [36]. Artists often encounter challenges, and emotional management helps them cope with challenges and maintain creative thinking [37]. ED promotes emotional connections, i.e., establishing emotional connections and resonance with others [38]. Emotional connections can inspire creativity, as they enable individuals to better understand and express the emotions of others. In summary, this paper proposes the following hypothesis: ED positively influences the creativity of art students (H3).

2.5. Environmental art perception, emotional development, and creativity

Emotional expression is a core part of ED, involving the transformation of emotions into creativity and artistic works [39]. Through emotional expression, individuals can transform their emotions into various forms of art, music, dance, and drama. Emotional expression contributes to creating works with emotional depth and impact. By expressing emotions, individuals can convey their inner emotional experiences to the audience and evoke emotional resonance. Emotional management includes understanding and handling emotions [40]. The ability to manage emotions helps individuals navigate emotional fluctuations during the creative process, maintaining the coherence of their work. It also assists them in maintaining a positive emotional state when facing setbacks and difficulties, which is crucial for the development of creativity. Artists often encounter challenges, and emotional management helps them cope with challenges and maintain creative thinking [41].

Emotional development, by enhancing emotional awareness, indirectly influences creativity [22]. ED improves the quality and depth of emotional expression, enabling individuals to better transform emotions into creativity and works of art [34]. The improvement in emotional expression indirectly drives the development of creative thinking and artistic abilities, aiding creators in producing works with greater emotional depth and resonance, thereby inspiring the audience's emotional experiences. Emotional management involves dealing with emotional fluctuations and facing setbacks. Individuals experience emotional fluctuations and challenges during the creative process, and strong emotional management helps maintain emotional balance, sustaining the coherence of creative work. The development of emotional management skills indirectly contributes to the development of creative thinking and artistic abilities. ED, as a comprehensive process, influences individual creative thinking and artistic abilities through emotional cognition, emotional expression, and emotional management. In summary, this paper proposes the following hypothesis: ED of art students plays a mediating role between EAP and creativity (H4).

2.6. Theoretical framework construction

Emotional development theory emphasizes that emotions are a crucial component of comprehensive individual development, encompassing aspects such as emotional cognition, emotional expression, and emotional management [42]. EAP is considered a stimulant for ED, providing emotionally rich experiences that help students better understand and express emotions. This is related to the concept of emotional intelligence in ED theory, as emotional intelligence involves the cognitive and processing abilities related to emotions. In summary, based on ED theory, this paper explains the impact of EAP on student creativity; EAP, by influencing ED, indirectly promotes the development of student creativity. Therefore, Figure 1 presents the proposed research framework.

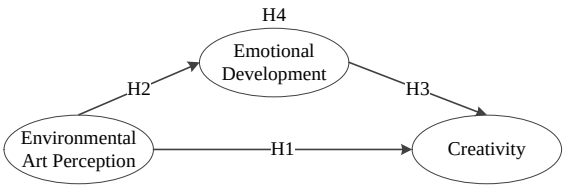

Figure 1. Research model

3. METHOD

This study introduces a comprehensive research design aimed at investigating the interplay between fine arts students' perception of environmental art, their creativity, and ED. Utilizing quantitative data, it aims to fully understand how environmental art impacts students' creativity and emotional capabilities. According to Davies *et al*. [43], isolating creativity as an independent course in primary and secondary education poses a challenge. Even with the implementation of a standalone creativity course, the benefits of learning transfer may not materialize. Therefore, integrating creativity cultivation into various subject areas is considered more effective, with scholars suggesting that fostering creativity across different domains is more beneficial for creative outcomes in those domains [44].

3.1. Research subjects

Focusing on university students majoring in fine arts at two general art colleges in Henan Province, China, this study aims to understand the impact of environmental art on their creativity and ED. A total of 647 questionnaires were distributed, with 585 valid responses (94.50% effective rate) after excluding incomplete or inconsistent submissions. The sample comprised 143 male and 451 female students, with a mix of urban (249)

and rural (336) backgrounds, highlighting a diverse demographic with ages ranging from 19.57 to 21.73 years. This target group is selected for their potential in fine arts creativity and the homogeneity of their educational background, providing clarity on the factors influencing their creativity and ED.

3.2. Survey questionnaire design

This study investigates the roles of EAP, creativity, and ED among fine arts students. EAP is explored as the sensory experience of art in university settings. The questionnaire utilizes the EAP scale developed by [45], [46] measured by a 5-item scale with a reliability coefficient of 0.767, indicating students' interaction with campus art. Creativity is viewed as a multifaceted skill encompassing creative thinking, imagination, and problem-solving, The questionnaire adopts the creativity scale developed by Kaufman [47], assessed through a 15-item scale with high reliability scores (0.931, 0.897, and 0.872) indicating the level of creativity among participants. ED, defined as the advancement in emotional cognition, expression, and management, by Haeyen *et al*. [48] is used in this questionnaire, is evaluated using a 15-item scale focusing on understanding and managing emotions, with reliability coefficients ranging from 0.830 to 0.861. These constructs are measured to understand their interplay and impact on fine arts students' development, without a detailed analysis of sub-dimensions but focusing on overall scores for each area.

3.3. Analysis

The analysis in this study was conducted using SPSS (version 26) and AMOS (version 26) software. This analysis involved the use of Cronbach's alpha (α) for reliability analysis to assess the internal consistency of the measurements. Confirmatory factor analysis (CFA) was conducted to evaluate the model fit. Furthermore, structural equation modeling was performed to test the proposed framework, and mediation analysis was conducted to determine the mediating role of variables in the relationship between independent and dependent variables.

4. RESULTS

4.1. Common method bias

The data for this study were primarily obtained through a survey questionnaire. To mitigate the potential issues of common method bias (CMB) arising from the same source of survey questionnaires, participants, or testing environment, a channel bias measurement was conducted. Reverse items were included in the questionnaire design, and post-statistical controls were implemented to reduce or even avoid the impact of CMB [49]. The single-factor test method was employed, with the variables initially entered into the exploratory factor range. Validation was performed on the unrotated factor. The explained variance of the first principal component before rotation was 29.102%, which is less than the recommended threshold of 40%, indicating that the CMB test passed [49].

4.2. Confirmatory factor analysis

We conducted a CFA for EAP, creativity, and ED using AMOS 26, as shown in Table 1. The assumed three-factor model (M1) demonstrated a good fit, meeting the recommended criteria. In comparison, the fit indices for the alternative two-factor (M2), two-factor (M3), and single-factor (M4) models were noticeably inferior to the three-factor model. This suggests a good discriminant validity among the main variables in the questionnaire, making it appropriate to proceed with the analysis of relationships between variables in the next step.

Table 1. Confirmatory factor analysis

Model	Variables	χ^2/df	GFI	IFI	CFI	RMSEA
M1	EAP, ED, CR	2.317	0.920	0.950	0.950	0.046
M2	EAP+M, CR	3.388	0.762	0.821	0.821	0.082
M3	EAP, ED+CR	3.445	0.675	0.673	0.679	0.111
M4	EAP+ED+CR	5.533	0.552	0.397	0.397	0.149

Note: EAP=environmental art perception; ED=emotional development; CR=creativity

4.3. Analysis of variable correlations

Table 2 presents the means, standard deviations, and correlation coefficients of the variables. EAP is significantly positively correlated with ED (r=0.402, p<0.01) and significantly positively correlated with creativity (r=0.347, p<0.01). ED is significantly positively correlated with creativity (r=0.445, p<0.01). Therefore, hypotheses 1, 2, and 3 receive preliminary support.

Table 2 Descriptive statistics and correlation analysis

Variables	M	SD	EAP	ED	CR
EAP	3.625	0.569	1		
ED	3.689	0.534	0.402**	1	
CR	4.770	0.592	0.347**	0.445**	1

Note: significance level **p<0.01; EAP=environmental art perception; ED=emotional development; CR=creativity

4.4. Hypothesis testing

This study employed Baron and Kenny [50] stepwise method to examine the mediating effects. The stepwise method consists of four conditions, detailed as: i) Condition 1: the independent variable has a significant impact on the dependent variable; ii) Condition 2: the independent variable has a significant impact on the mediating variable; iii) Condition 3: the mediating variable has a significant impact on the dependent variable; and iv) Condition 4: after introducing the mediating variable, the coefficient of the independent variable's impact on the dependent variable decreases.

In this study, EAP is a single-dimension scale, while ED and creativity are multidimensional scales. A second-order model was constructed for ED and creativity. Using Baron and Kenny stepwise method [50], as illustrated in Figure 2, we first built the direct model as seen in Figure 2(a) for the independent variable (EAP) on the dependent variable (creativity) and then constructed the indirect model as seen in Figure 2(b) involving the mediating variable (ED).

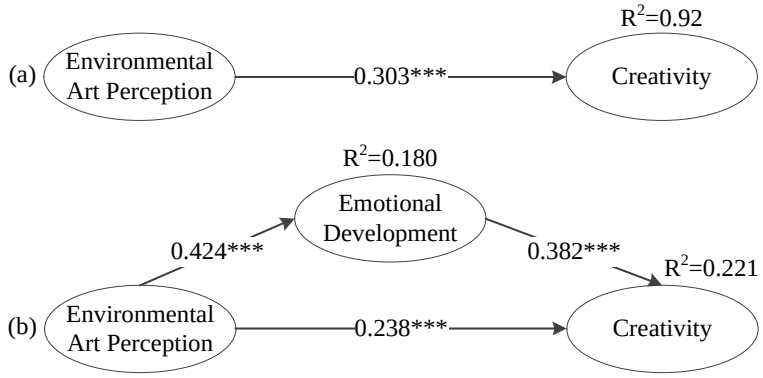

Figure 2. Mediation test model results in (a) direct path model and (b) indirect path model

The results, as presented in Table 3, indicate that in the direct path model, the coefficient of EAP on creativity is 0.303, and it reaches a significant level, supporting hypothesis H1. This aligns with the first condition of Baron and Kenny [50] stepwise method: the independent variable has a significant impact on the dependent variable. In the indirect path model, the coefficient of EAP on ED is 0.424, reaching a significant level, supporting hypothesis H2. Additionally, ED has a coefficient of 0.382 on creativity, and it is significant, supporting hypothesis H3. These findings meet the second and third conditions of Baron and Kenny [50] stepwise method: the independent variable has a significant impact on the mediating variable, and the mediating variable has a significant impact on the dependent variable.

The coefficient of EAP on creativity in Table 3 is based on the premise of adding the mediating variable ED. In the direct path model without adding the mediating variable ED, the coefficient of EAP on creativity is 0.304. However, with the inclusion of the mediating variable, the coefficient decreases to 0.238. This supports the fourth condition of Baron and Kenny [50] stepwise method: after adding the mediating variable, the coefficient of the independent variable's impact on the dependent variable decreases. Hypothesis H4 is thus supported.

Table 3. Summary of standardized regression coefficients

Model	Path	β	S.E.	t	p	Results
Direct path model	EAP→CR	0.303	0.073	5.125	***	H1 is supported
Indirect path model	EAP→ED	0.424	0.094	8.741	***	H2 is supported
	ED→CR	0.382	0.058	6.802	***	H3 is supported
	EAP→CR	0.238	0.093	4.029	***	-

Note: significance level ***p<0.001; EAP=environmental art perception; ED=emotional development; CR=creativity

5. DISCUSSION

In this study, we thoroughly explored the relationships between EAP, creativity, and ED, examining the mediating effects through a stepwise testing method. Through the survey and analysis of fine arts major university students, we obtained crucial findings regarding the relationships among these three factors. EAP has a significant positive impact on creativity. The research results indicate that campus environmental art design plays a positive role in fostering the creativity of art students, consistent with conclusions drawn by several researchers [23]–[25]. This may be attributed to students' perception and interaction with artistic elements in the university campus and learning environment, contributing to the stimulation of their creative thinking and imagination. EAP provides students with inspiration and stimuli for creation, thereby promoting the development of their creative expression and artistic abilities. These authors suggest that the engagement with environmental art within educational settings stimulates students' creative thinking and imagination by providing continuous inspiration and challenges that encourage exploration of new perspectives.

Emotional development serves as a mediator between environmental art perception and creativity. Environmental art perception has a significantly positive impact on ED, aligning with conclusions from previous scholars [20], [28]–[31]. ED also has a significantly positive impact on creativity, consistent with conclusions from several studies [6], [33], [34], [36], [37], indicating that ED not only enhances creativity but also enriches students' capacity for empathetic and nuanced creative expression. The deep engagement with environmental art facilitates a richer emotional and creative growth, suggesting a symbiotic relationship where ED both influences and is influenced by creative activities.

These insights argue for the integration of ED strategies within art education, leveraging environmental art as a catalyst for fostering both creativity and emotional intelligence. By embedding environmental art in educational contexts, we can provide a holistic approach that nurtures future art professionals who excel in their creative and emotional capabilities. This study underscores the necessity of creating educational environments that promote a comprehensive development, preparing students to contribute innovatively and empathetically in their respective fields.

6. CONCLUSION

The study conclusively demonstrates that environmental art perception significantly fosters creativity in fine arts university students by enhancing their interaction with and appreciation of artistic elements within their campus environments. Furthermore, emotional development is identified as a pivotal mediator in this relationship, suggesting that a deeper understanding and management of emotions can substantially contribute to creative endeavors. Consequently, educational strategies that prioritize the optimization of environmental art and the nurturing of emotional skills are recommended to cultivate well-rounded art professionals. This research underlines the importance of integrating environmental art perception and emotional development into fine arts education to promote creativity and emotional intelligence among students.

REFERENCES

[1] K. L. Rieger, W. M. Chernomas, D. E. McMillan, and F. L. Morin, "Navigating creativity within arts-based pedagogy: implications of a constructivist grounded theory study," *Nurse Education Today*, vol. 91, p. 104465, 2020, doi: 10.1016/j.nedt.2020.104465.

[2] T. Tang, V. Vezzani, and V. Eriksson, "Developing critical thinking, collective creativity skills and problem solving through playful design jams," *Thinking Skills and Creativity*, vol. 37, p. 100696, 2020, doi: 10.1016/j.tsc.2020.100696.

[3] M. J. Elias, "What if the doors of every schoolhouse opened to social-emotional learning tomorrow: Reflections on how to feasibly scale up high-quality SEL," *Educational Psychologist*, vol. 54, no. 3, pp. 233–245, 2019, doi: 10.1080/00461520.2019.1636655.

[4] D. M. Kholikova, "Development of innovative thinking skills in higher education students," *Theoretical & Applied Science*, no. 6, pp. 549–552, 2021, doi: 10.15863/TAS.2021.06.98.64.

[5] M. Estrada, D. Monferrer, A. Rodríguez, and M. Á. Moliner, "Does emotional intelligence influence academic performance? The role of compassion and engagement in education for sustainable development," *Sustainability*, vol. 13, no. 4, p. 1721, 2021, doi: 10.3390/su13041721.

[6] L. I. González-Pérez and M. S. Ramírez-Montoya, "Components of education 4.0 in 21st century skills frameworks: systematic review," *Sustainability*, vol. 14, no. 3, p. 1493, 2022, doi: 10.3390/su14031493.

[7] R. Affifi, "Beauty in the darkness: aesthetic education in the ecological crisis," *Journal of Philosophy of Education*, vol. 54, no. 4, pp. 1126–1138, 2020, doi: 10.1111/1467-9752.12475.

[8] R. A. Smith and C. M. Smith, "Aesthetics and environmental education," *Journal of Aesthetic Education*, vol. 4, no. 4, pp. 125–140, 1970, doi: 10.2307/3331291.

[9] M. Y. Mak and S. T. Ng, "The art and science of Feng Shui—a study on architects' perception," *Building and Environment*, vol. 40, no. 3, pp. 427–434, 2005, doi: 10.1016/j.buildenv.2004.07.016.

[10] X. Zhang, "Discussion on the teaching mode innovation of environmental art design major based on OBE concept," *Journal of World Architecture*, vol. 4, no. 6, pp. 8–10, 2020, doi: 10.26689/jwa.v4i6.1743.

[11] W. Niu, "Individual and environmental influences on Chinese student creativity," *The Journal of Creative Behavior*, vol. 41, no. 3, pp. 151–175, 2007, doi: 10.1002/j.2162-6057.2007.tb01286.x.
[12] M. Eddy *et al.*, "Local-level implementation of social emotional learning in arts education: moving the heart through the arts," *Arts Education Policy Review*, vol. 122, no. 3, pp. 193–204, 2021, doi: 10.1080/10632913.2020.1788681.
[13] J. R. Robinson, B. W. Freeburg, and J. Workman, "Family environment and creativity in fashion design students," *International Journal of Fashion Design, Technology and Education*, vol. 6, no. 3, pp. 200–209, 2013, doi: 10.1080/17543266.2013.835875.
[14] B. Gu and Y. Hirai, "Influence of art museum exhibition space design on the emotions of the viewer," in *Advances in Affective and Pleasurable Design: Proceedings of the AHFE 2018 International Conference on Affective and Pleasurable Design*, 2019, pp. 237–249, doi: 10.1007/978-3-319-94944-4_27.
[15] C. A. Farrington *et al.*, *Arts education and social-emotional learning outcomes among K-12 students: developing a theory of action*. Chicago, Illinois: University of Chicago Consortium on School Research, 2019.
[16] E. Keller, L. Sommer, C. A. Klöckner, and D. Hanss, "Contextualizing information enhances the experience of environmental art," *Psychology of Aesthetics, Creativity, and the Arts*, vol. 14, no. 3, pp. 264–275, 2020, doi: 10.1037/aca0000213.
[17] A. Berleant, *Aesthetics beyond the arts: new and recent essays*. Routledge, 2016.
[18] N. Anwar, N. H. N. Mahmood, M. Y. Yusliza, T. Ramayah, J. N. Faezah, and W. Khalid, "Green human resource management for organisational citizenship behaviour towards the environment and environmental performance on a university campus," *Journal of Cleaner Production*, vol. 256, p. 120401, 2020, doi: 10.1016/j.jclepro.2020.120401.
[19] E. H. Erikson, *Childhood and society*. WW Norton & Company, 1993.
[20] R. Alexander *et al.*, "The neuroscience of positive emotions and affect: Implications for cultivating happiness and wellbeing," *Neuroscience & Biobehavioral Reviews*, vol. 121, pp. 220–249, 2021, doi: 10.1016/j.neubiorev.2020.12.002.
[21] D. Papadopoulos, "Psychological framework for gifted children's cognitive and socio-emotional development: a review of the research literature and implications," *Journal for the Education of Gifted Young Scientists*, vol. 8, no. 1, pp. 305–323, 2020, doi: 10.17478/jegys.666308.
[22] X. Deng, X. Guo, Y. J. Wu, and M. Chen, "Perceived environmental dynamism promotes entrepreneurial team member's innovation: explanations based on the uncertainty reduction theory," *International Journal of Environmental Research and Public Health*, vol. 18, no. 4, p. 2033, 2021, doi: 10.3390/ijerph18042033.
[23] P. Boarin, A. Martinez-Molina, and I. Juan-Ferruses, "Understanding students' perception of sustainability in architecture education: A comparison among universities in three different continents," *Journal of Cleaner Production*, vol. 248, p. 119237, 2020, doi: 10.1016/j.jclepro.2019.119237.
[24] D. Alt and N. Raichel, "Enhancing perceived digital literacy skills and creative self-concept through gamified learning environments: Insights from a longitudinal study," *International Journal of Educational Research*, vol. 101, p. 101561, 2020, doi: 10.1016/j.ijer.2020.101561.
[25] B. Yu, "Design and Expression of architectural art and cultural elements in urban landscape," *Journal of Civil Engineering and Urban Planning*, vol. 4, no. 1, pp. 63–75, 2022, doi: 10.23977/jceup.2022.040109.
[26] S. Mastria, S. Agnoli, and G. E. Corazza, "How does emotion influence the creativity evaluation of exogenous alternative ideas?" *PloS one*, vol. 14, no. 7, p. e0219298, 2019, doi: 10.1371/journal.pone.0219298.
[27] L. K. Sommer, J. K. Swim, E. Keller, and C. A. Klöckner, ""Pollution Pods": the merging of art and psychology to engage the public in climate change," *Global Environmental Change*, vol. 59, p. 101992, 2019, doi: 10.1016/j.gloenvcha.2019.101992.
[28] P. J. Sheldon, "Designing tourism experiences for inner transformation," *Annals of Tourism Research*, vol. 83, p. 102935, 2020, doi: 10.1016/j.annals.2020.102935.
[29] I. Bower, R. Tucker, and P. G. Enticott, "Impact of built environment design on emotion measured via neurophysiological correlates and subjective indicators: a systematic review," *Journal of Environmental Psychology*, vol. 66, p. 101344, 2019, doi: 10.1016/j.jenvp.2019.101344.
[30] J. M. Goldberg, M. Sklad, T. R. Elfrink, K. M. Schreurs, E. T. Bohlmeijer, and A. M. Clarke, "Effectiveness of interventions adopting a whole school approach to enhancing social and emotional development: a meta-analysis," *European Journal of Psychology of Education*, vol. 34, pp. 755–782, 2019, doi: 10.1007/s10212-018-0406-9.
[31] J. L. Higuera-Trujillo, C. Llinares, and E. Macagno, "The cognitive-emotional design and study of architectural space: A scoping review of neuroarchitecture and its precursor approaches," *Sensors*, vol. 21, no. 6, p. 2193, 2021, doi: 10.3390/s21062193.
[32] M. J. B. Ludvik, *The neuroscience of learning and development: Enhancing creativity, compassion, critical thinking, and peace in higher education*. Taylor & Francis, 2023.
[33] D. Fancourt, C. Garnett, N. Spiro, R. West, and D. Müllensiefen, "How do artistic creative activities regulate our emotions? Validation of the emotion regulation strategies for artistic creative activities scale (ERS-ACA)," *PloS One*, vol. 14, no. 2, p. e0211362, 2019, doi: 10.1371/journal.pone.0211362.
[34] H. Orkibi and N. Ram-Vlasov, "Linking trauma to posttraumatic growth and mental health through emotional and cognitive creativity," *Psychology of Aesthetics, Creativity, and the Arts*, vol. 13, no. 4, pp. 416–430, 2019, doi: 10.1037/aca0000193.
[35] D. E. Kaplan, "Creativity in education: teaching for creativity development," *Psychology*, vol. 10, no. 2, pp. 140–147, 2019, doi: 10.4236/psych.2019.102012.
[36] G. Arslan and P. Wong, "Embracing life's challenges: developing a tool for assessing resilient mindset in second wave positive Psychology," *Journal of Happiness and Health*, vol. 4, no. 1, pp. 1–10, 2023, doi: 10.47602/johah.v4i1.53.
[37] C. A. Malchiodi, *Trauma and expressive arts therapy: brain, body, and imagination in the healing process*. Guilford Publications, 2020.
[38] J. S. Blasco-Magraner, G. Bernabe-Valero, P. Marín-Liébana, and C. Moret-Tatay, "Effects of the educational use of music on 3- to 12-year-old children's emotional development: a systematic review," *International Journal of Environmental Research and Public Health*, vol. 18, no. 7, p. 3668, 2021, doi: 10.3390/ijerph18073668.
[39] M.-P. Celume, L. Cognard, and Z. Chamot, "Thinking about emotions in education: integrating the transformation of learning at school," in *Integrated Education and Learning*. Cham: Springer International Publishing, 2023, pp. 201–220.
[40] A. R. Hochschild, "Ideology and emotion management: a perspective and path for future research," *Research Agendas in the Sociology of Emotions*, vol. 117, pp. 117–142, 1990.
[41] A. Sunassee, C. Bokhoree, and A. Patrizio, "Students' empathy for the environment through eco-art place-based education: a review," *Ecologies*, vol. 2, no. 2, pp. 214–247, 2021, doi: 10.3390/ecologies2020013.
[42] K. Hoemann, F. Xu, and L. F. Barrett, "Emotion words, emotion concepts, and emotional development in children: a constructionist hypothesis," *Developmental Psychology*, vol. 55, no. 9, pp. 1830–1849, 2019, doi: 10.1037/dev0000686.
[43] D. Davies, D. Jindal-Snape, C. Collier, R. Digby, P. Hay, and A. Howe, "Creative learning environments in education—a systematic literature review," *Thinking Skills and Creativity*, vol. 8, pp. 80–91, 2013, doi: 10.1016/j.tsc.2012.07.004.
[44] T. M. Amabile, *Creativity and innovation in organizations*. Harvard Business School Boston, 1996.

[45] M. Subiza-Pérez, K. Hauru, K. Korpela, A. Haapala, and S. Lehvävirta, "Perceived environmental aesthetic qualities scale (PEAQS)–A self-report tool for the evaluation of green-blue spaces," *Urban Forestry & Urban Greening*, vol. 43, p. 126383, 2019, doi: 10.1016/j.ufug.2019.126383.
[46] R. Ho and W. T. Au, "Scale development for environmental perception of public space," *Frontiers in psychology*, vol. 11, p. 596790, 2020, doi: 10.3389/fpsyg.2020.596790.
[47] J. C. Kaufman, "Counting the muses: development of the Kaufman domains of creativity scale (K-DOCS)," *Psychology of Aesthetics, Creativity, and the Arts*, vol. 6, no. 4, pp. 298–308, 2012, doi: 10.4236/psych.2019.102012.
[48] S. Haeyen, S. van Hooren, W. M. van der Veld, and G. Hutschemaekers, "Measuring the contribution of art therapy in multidisciplinary treatment of personality disorders: The construction of the self-expression and emotion regulation in art therapy scale (SERATS)," *Personality and Mental Health*, vol. 12, no. 1, pp. 3–14, 2018, doi: 10.1002/pmh.1379.
[49] P. M. Podsakoff, S. B. MacKenzie, J.-Y. Lee, and N. P. Podsakoff, "Common method biases in behavioral research: a critical review of the literature and recommended remedies," *Journal of Applied Psychology*, vol. 88, no. 5, pp. 879–903, 2003, doi: 10.1037/0021-9010.88.5.879.
[50] R. M. Baron and D. A. Kenny, "The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations," *Journal of Personality and Social Psychology*, vol. 51, no. 6, pp. 1173–1182, 1986, doi: 10.1037/0022-3514.51.6.1173.

BIOGRAPHIES OF AUTHORS

Yuanyuan Sun is currently pursuing a Ph.D. in Arts at the International College (IC) of Krirk University in Thailand. Her research focuses on the creativity of art university students, particularly in the areas of perceptual art, environmental art, and emotional development. She can be contacted at email: 59419127@qq.com.

Shunli Liu is a Ph.D. supervisor and visiting professor at International College (IC) of Krirk University in Thailand. His research focuses on product-service system design and product experience design. He has led research projects, including the Cultural and Artistic Science Planning and Tourism Research Project in Hebei Province, the Doctoral Research Startup Fund Project at Beihua University of Aeronautics and Astronautics, school-level research projects, teaching reform projects, and a key research topic for the Tianjin Municipal Education Commission in China. He can be contacted at email: 419937407@qq.com.