



EXAMINING THE MEDIATING ROLE OF GREEN THINKING ABOUT THE IMPACT OF PERCEIVED GREEN INCLUSIVE LEADERSHIP ON STUDENTS' GREEN CREATIVITY

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Abstract:

Grounded in Amabile's Componential Theory of Creativity (CTC), this study proposed and tested a mediation model examining how students' perceptions of green inclusive leadership (PGIL) influence their green creativity (GCRY) through green thinking (GT). Using convenience sampling, 598 students from two colleges in China were selected to complete questionnaires. PROCESS macro analyzed the data, confirming all hypotheses. Findings showed that students' PGIL positively affected their GCRY through GT. This study confirmed the conceptual framework of PGIL and the CTC, addressing the need for further research on the motivational processes behind GCRY. The uniqueness of this research stems from its application of the CTC within sustainability education. Additionally, the study examines the practical implications of green leadership in fostering GCRY in colleges.

Keywords: perceived green inclusive leadership; green thinking; green creativity; college students

1. Introduction

As environmental challenges intensify, today's college students are facing the repercussions of past neglect and current indifference toward the environment. However,

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they also play a critical role in gaining the technical expertise required to develop solutions for the ongoing environmental crises (Liu, 2023; Shafiei & Maleksaeidi, 2020). Scholars stress the necessity of equipping students with creative thinking skills to address complex issues like environmental sustainability (Clark *et al.*, 2020). Despite this, there is a clear gap in combining creativity education with environmental research and sustainable development within college curricula (Cheng, 2019; Hensley, 2020; Saleh & Brem, 2023). Green creativity (GCRY), an ethical branch of general creativity, centers on sustainability and fosters social values (Bhutto *et al.*, 2022; Chen *et al.*, 2014; Li *et al.*, 2020; Tuan, 2020). Higher education institutions (HEIs) are urged to adopt ecological education as part of their societal responsibility, nurturing sustainability-oriented GCRY in students. This is essential not only for environmental conservation but also for shaping future socio-economic progress (Cheng, 2019; Clark *et al.*, 2020; Rodríguez-Chueca *et al.*, 2020). Consequently, promoting students' creativity for environmental protection is crucial for guiding society toward a sustainable future.

Supervisors' leadership plays a critical role in shaping individuals' green creativity (GCRY) (Arici & Uysal, 2022; Li *et al.*, 2020; Mittal & Dhar, 2016; Tuan, 2020). In the context of educational leadership, it is crucial to consider factors such as diversity, difference, and disability. Inclusive leadership offers a framework for effectively managing diversity within the school community (Rayner, 2009). Previous studies have examined the influence of inclusive leadership on creativity and innovation (Javed *et al.*, 2019; Zhu & Zhang, 2019). More recently, the concept of green inclusive leadership (GIL) has gained traction as a key driver of sustainability (Aboramadan *et al.*, 2021; Bhutto *et al.*, 2022). GIL integrates environmental awareness with diversity and inclusion, creating an environment that nurtures creativity aligned with sustainability goals (Bhutto *et al.*, 2022). As such, understanding how GIL affects students' GCRY is essential for promoting pro-environmental creativity and helping universities meet sustainability objectives. Despite increasing interest in GIL, there is still a lack of empirical research on its impact on GCRY (Bhutto *et al.*, 2022), highlighting the need for further studies to explore the connection between perceived GIL and students' GCRY, ultimately advancing sustainability initiatives in higher education.

Given the existing gap in research and the critical role of PGIL and GCRY in higher education, this study aims to explore the complex mechanisms that influence their relationship. The Componential Theory of Creativity (CTC), a foundational framework in creativity and organizational innovation studies, posits that creativity results from the interplay of environmental and individual factors (Amabile, 1988). Among these factors, leadership is a key external influence that can either encourage or hinder creativity by shaping individual attributes (Li *et al.*, 2020). Creative thinking, identified as a central component of individual creativity, plays a mediating role in the connection between leadership and creativity (Meng & Zhao, 2018). It is crucial in understanding the mediating process between leadership and creativity (Amabile, 1983; Amabile & Mueller, 2008). However, current empirical studies on GCRY have not fully addressed this aspect

(Bhutto *et al.*, 2022; Li *et al.*, 2020). Therefore, investigating the mediating effect in this context could provide valuable insights into the theoretical linkages.

To address the existing research gaps and uncover the complex mechanisms influencing GCRY, this study, guided by the CTC, seeks to develop and test hypotheses concerning the mediating role of GT. This proposed mediator will be explored within the framework of PGIL and its potential effect on college students' GCRY. By doing so, the study aims to deepen our understanding of how PGIL interacts with cognitive components that promote environmentally sustainable creativity. The targeted investigation will provide a comprehensive analysis of the mediating process, contributing to the broader discussion on GCRY and offering practical insights for fostering a more sustainable future in higher education.

2. Literature Review

2.1 PGIL and GCRY

GCRY holds significant societal value, especially in environmental sustainability (Chen & Chang, 2013). It involves individuals proposing innovative solutions to environmental challenges, supporting green ideas, and generating valuable green products, practices, or services (Li *et al.*, 2020; Mittal & Dhar, 2016; Tuan, 2020; Zhang *et al.*, 2020). This creativity is influenced by both environmental and individual factors, aligning with the CTC, which emphasizes the importance of creative thinking (Amabile, 1983; Amabile *et al.*, 1996; Amabile & Mueller, 2008). According to the CTC, GCRY emerges when individuals have proficient creative thinking skills in supportive environments (Meng & Zhao, 2018).

Inclusive leadership, a relational style that fosters high-quality relationships, positively impacts individual innovation and creativity (Carmeli *et al.*, 2010; Volmer *et al.*, 2012; Amabile & Pratt, 2016; Choi *et al.*, 2015; Fang *et al.*, 2019; Javed *et al.*, 2019). It shares characteristics with ethical, servant, and transformational leadership styles, promoting learning and development (Avolio & Bass, 2002; Wang & Howell, 2010; Stone *et al.*, 2004). Inclusive leadership is thus seen as encompassing essential relational behaviors (Korkmaz *et al.*, 2022). This study focuses on Green Inclusive Leadership (GIL) due to its relevance to sustainability. GIL nurtures individual uniqueness, fosters belonging, demonstrates appreciation, and supports green initiatives (Korkmaz *et al.*, 2022). It involves an open-minded approach to green concepts, engaging followers in environmental discussions, and negotiating solutions (Abdou *et al.*, 2023; Aboramadan *et al.*, 2022; Thab *et al.*, 2023). GIL has been shown to positively impact green behaviors and GCRY (Patwary *et al.*, 2022; Bhutto *et al.*, 2022).

While the relationship between green transformational leadership and GCRY is well-studied (Chen & Chang, 2013; Li *et al.*, 2020; Mansoor *et al.*, 2021; Mittal & Dhar, 2016; Zhang *et al.*, 2020), research on GIL's impact on GCRY is limited (Bhutto *et al.*, 2022). The study of college students' GCRY, particularly in classroom settings, is still emerging. Given the positive impact of GIL on organizational environmental protection, it's plausible that PGIL can foster GCRY in classrooms. Previous research suggests that the

teacher-student relationship mirrors workplace dynamics, with teachers acting as organizational leaders (Bolkan *et al.*, 2011; Chory & McCroskey, 1999). Thus, PGIL exhibited by teachers could significantly influence college students' GCRY. This study hypothesizes:

H1: PGIL has a significant positive impact on the GCRY.

2.2 The Mediating Role of Green Thinking

Creative thinking is intricately linked to personal traits, perceptions, cognitions, and motor abilities (Amabile, 1983; Woodman *et al.*, 1993). In the context of green inclusive leadership, individuals are guided in green concepts, principles, research progress, hot topics, research methodology, and technology within the green field. These efforts are designed to inspire open, flexible, and critical thinking skills, fostering a tolerance for ambiguity (Abdou *et al.*, 2023). The practice of green inclusive leadership provides individuals with valuable opportunities to engage in green creativity production, and create environments conducive to independent thinking and exploration (Aboramadan *et al.*, 2022; Bhutto *et al.*, 2022). GIL ignites individuals' interest and curiosity in green research tasks, promoting persistence, the courage to challenge authority, and confidence in taking risks (Patwary *et al.*, 2022). Moreover, it assures individuals have the time and energy to study, providing the necessary conditions for focused attention on green tasks and independent thinking (Thab *et al.*, 2023). Given this comprehensive perspective, it is theoretically posited that GIL would serve as a catalyst for fostering the creativity within-individual component, namely GT. Therefore, the integration of GIL into the classroom environment is anticipated to positively influence college students' way of thinking. Based on the above discussion, this study proposes the following hypothesis:

H2: PGIL is positively related to GT.

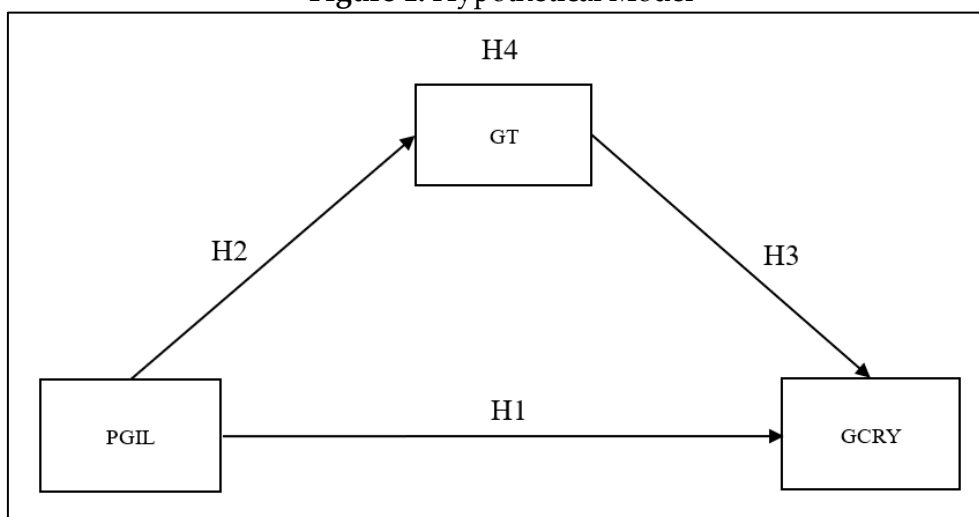
GCRY is the outcome of GT, which plays a vital role in every sub-process of GCRY (Al-Ghazali *et al.*, 2022). GT represents a paradigm shift in human perceptions and interactions with the environment (Knill, 1991a). This perspective posits that human society is an integral part of the ecosystem rather than a separate entity, emphasizing a responsibility to contribute to ecological sustainability (Knill, 1991b). GT involves awareness of environmental interconnectedness and the impact of human activities on nature (The Environmental Action Alliance, 2004). It fosters creative solutions that optimize resource use, enhance efficiency, and minimize environmental footprints (Caldera *et al.*, 2019; Thanki *et al.*, 2016; Verrier *et al.*, 2014). Individuals with strong GT capabilities are adept at identifying environmental challenges, generating solutions, and validating them through innovative approaches. Their cognitive flexibility allows them to transcend conventional patterns, making GT a crucial determinant in green initiatives and innovation (Ali *et al.*, 2020; Begum *et al.*, 2021; Akehurst *et al.*, 2012; Jones, 2019; Wu *et al.*, 2016).

H3: GT is positively related to GCRY.

GT has been identified as a mediating factor in the relationship between green transformational leadership and green innovation (Begum *et al.*, 2021). Al-Ghazali *et al.* (2022) further demonstrated that GT serves as a mediating mechanism through which green transformational leadership influences GCRY. Thus, we propose:

H4: GT mediates the correlation of PGIL and GCRY.

Figure 1: Hypothetical Model



Note: PGIL: Perceived Green Inclusive Leadership; GT: Green thinking; GCRY: Green Creativity.

3. Methods

3.1 Participants and Procedures

The study's participants were college students in Hebei, China. They were contacted through the student mailing list or engaged with them face-to-face in campus classrooms. A prerequisite for inclusion was enrollment in at least one elective course focused on sustainable lifestyle topics, which spanned the entire semester under a single lecturer. The study selected this population to represent the education sector. These colleges are known for taking social responsibility in cultivating students to protect the ecological environment. One of the colleges is the first to carry out environmental education in China, which is supported by the People's Government of Hebei Province and the Ministry of Ecological Environment. Students intend to be environmentally friendly, so it has a good representativeness.

3.2 Measures

PGIL was measured using a 9-item scale developed and validated by Carmeli *et al.* (2010). This scale was applied in the study to assess the leadership styles of lecturers who taught elective courses on environmental sustainability themes during this semester. The reliability of this scale was demonstrated with a Cronbach's alpha coefficient of 0.94, indicating high internal consistency. GT was assessed using a four-item scale adapted from Lee (2008) to measure individuals' environmental awareness and attitudes. The

scale demonstrated strong reliability, with Cronbach's alpha of 0.811 (Begum *et al.*, 2021). GCRY was measured using a 6-item scale from Chen and Chang (2013), with a Cronbach's alpha of 0.89, indicating strong internal consistency.

3.3 Data Analyses

The analysis of the collected data was conducted using SPSS. Descriptive statistics and correlation analyses were first performed. To test the research hypotheses, Hayes' (2017) PROCESS macro for SPSS was employed. Additionally, the mediating effect was evaluated using 5,000 bootstrap samples with a 95% confidence interval, thereby enhancing the robustness of the findings by providing more precise estimates of indirect effects.

4. Results

4.1 Correlation Analysis

To explore the relationships among the study variables, descriptive statistics and Pearson correlation analyses were performed. The Pearson correlation coefficients, which are shown in Table 1, ranged from 0.339 to 0.486, all of which were statistically significant at the $p < 0.001$ level. Specifically, the findings indicate a significant positive correlation between PGIL and GT ($r = 0.339$, $p < 0.001$). Furthermore, PGIL was found to be significantly positively correlated with GCRY ($r = 0.486$, $p < 0.001$). Additionally, a significant positive correlation was observed between GT and GCRY ($r = 0.419$, $p < 0.001$).

Table 1: Descriptive statistics and correlations analysis

Variables	<i>M</i>	<i>SD</i>	PGIL	GT	GCRY
PGIL	4.077	0.997	1		
GT	3.793	0.908	0.339***	1	
GCRY	3.551	1.023	0.486***	0.419***	1

Note: *M*: Mean, *SD*: Standard deviations; PGIL: Perceived Green Inclusive Leadership; GT: Green Thinking; GCRY: Green Creativity. *** $p < 0.001$.

4.2 Hypotheses Testing

To investigate the mediating role of GT in the relationship between PGIL and GCRY, PROCESS Model 4 (Hayes, 2017) was employed. The results of this analysis are summarized in Table 2. In Model 1, it was found that PGIL significantly and positively predicted GCRY ($\beta = 0.486$, $p < 0.001$), which supports Hypothesis 1. In Model 2, PGIL was shown to significantly and positively predict GT ($\beta = 0.339$, $p < 0.001$), and GT was also a significant positive predictor of GCRY ($\beta = 0.287$, $p < 0.001$). Finally, Model 3 revealed that, even with GT included as a mediating variable, PGIL continued to significantly and positively predict GCRY ($\beta = 0.389$, $p < 0.001$). The decrease in the coefficient (β) from 0.486 to 0.389 suggests that GT partially mediates the relationship between PGIL and GCRY, thereby supporting Hypothesis 2.

Table 2: Green Thinking Mediation Model Analysis

Variables	Model 1		Model 2		Model 3	
	GCRY		GT		GCRY	
	β	t	β	t	β	t
PGIL	0.486	13.587***	0.339	8.792***	0.389	10.742***
GT					0.287	7.941***
R^2	0.236		0.115		0.332	
F	184.606***		77.293***		133.446***	

Note: PGIL: Perceived Green Inclusive Leadership; GT: Green Thinking; GCRY: Green Creativity. *** $p < 0.001$.

To further validate these findings, a bias-corrected nonparametric percentile bootstrap method was used to assess the mediating effect of GT. The results showed an indirect effect of 0.100, with a 95% confidence interval (CI) ranging from 0.067 to 0.139, which does not include zero. Additionally, the direct effect was 0.399, with a 95% CI ranging from 0.326 to 0.472, also excluding zero. These findings provide additional evidence for the significant mediating role of GT. Detailed results are presented in Table 3.

Table 3: Mediation Effect with Bootstrapping

Path	Effect	95% LLCI	95% ULCI
Direct effects PGIL→GCRY	0.399	0.326	0.472
Indirect effects PGIL→GT→GCRY	0.100	0.067	0.139
Total effects PGIL→GCRY	0.499	0.427	0.571

Note: Bootstrap random sampling 5,000 times; LLCI: Lower limit of confidence interval; ULCI: Upper limit of confidence interval. PGIL: Perceived Green Inclusive Leadership; GT: Green Thinking; GCRY: Green Creativity.

5. Discussion

This study examined the relationships between college students' PGIL, GT, and GCRY. The findings reveal that PGIL has a direct and significant positive effect on GCRY, supporting Hypothesis 1. This result is consistent with prior empirical research that has explored the role of green inclusive leadership in promoting individual green creativity (Bhutto *et al.*, 2022; Sürücü, 2024). Green inclusive leaders adopt unconventional approaches to assess their followers' creativity, emphasizing the value of individual differences and promoting diversity and uniqueness. This inclusive leadership style encourages creativity among followers (Carmeli *et al.*, 2010). Specifically, green inclusive leaders foster an open, inclusive, and collaborative campus environment, where students feel that their green ideas and perspectives are both respected and valued. This sense of recognition boosts students' confidence in experimenting with new green initiatives, thereby nurturing the growth of GCRY.

Our findings provide support for the hypothesis that PGIL positively influences GT, which aligns with existing literature on the impact of leadership on individuals' cognitive processes (Al-Ghazali *et al.*, 2022; Begum *et al.*, 2021), thus reinforcing this established link. Additionally, the support for Hypothesis 2 is consistent with the principles of the Componential Theory of Creativity (CTC), which posits that leadership can influence individuals' cognitive and mental processes (Amabile *et al.*, 1996; Meng & Zhao, 2018). Specifically, the results suggest that through PGIL, leaders can communicate the institution's commitment to environmental sustainability to students. This highlights the important role of leadership in shaping students' cognitive approaches toward green initiatives and sustainability efforts.

Statistical analysis also supported Hypothesis 3, which posits a positive relationship between GT and GCRY. This hypothesis was derived by extending previous research on the connection between GT and GCRY (Al-Ghazali *et al.*, 2022; Begum *et al.*, 2021). Moreover, this result is consistent with the principles of the Componential Theory of Creativity (CTC), which suggests that cognitive abilities can enhance individuals' motivation to engage in pro-environmental behaviors. The support for this hypothesis indicates that students who perceive their thinking as aligned with environmental protection and responsible actions are more likely to be active, enthusiastic, and motivated to generate creative ideas related to the environment in the classroom.

The findings of this study support the mediating role of GT in the relationship between PGIL and GCRY, revealing a novel link that has not been explored in previous research. The results indicate that PGIL influences GCRY indirectly through its impact on GT. Given that the indirect effect shares the same positive sign as the direct effect in this study, GT is identified as a mediator, aligning with prior research (Meng & Zhao, 2018). This also echoes earlier studies that have used GT to explain environmentally-related behaviors (Begum *et al.*, 2021), thereby providing support for Hypothesis 4.

6. Implications

6.1 Theoretical Implications

This study makes several theoretical contributions. First, it presents a model that explains how PGIL affects college students' GCRY through the mediation of GT. The conceptualization of PGIL provides a foundation for advancing theoretical insights in the field of green or sustainable leadership studies. Second, the study confirms the positive influence of PGIL on college students' GCRY, which aligns with previous research on various forms of green leadership (Aboramadan *et al.*, 2021; Bhutto *et al.*, 2021; Li *et al.*, 2020). This finding demonstrates the relevance of green inclusive leadership theories in the context of higher education. Third, the study highlights the mediating role of GT in the relationship between PGIL and GCRY, in line with the Componential Theory of Creativity (Amabile & Mueller, 2008), thus enhancing the understanding of the motivational mechanisms underlying GCRY in existing literature.

6.2 Practical Implications

First, the research highlights the crucial role of PGIL in promoting GCRY among students. To capitalize on this, university leaders should focus on cultivating educators who embody the principles of green inclusive leadership. This can be achieved by implementing systematic and normative human resource practices aimed at selecting educators with a strong commitment to environmental sustainability. For existing faculty, institutions should offer regular training and professional development programs on environmental sustainability, helping educators better understand and apply green inclusive leadership practices. This will contribute to creating a more sustainable and innovative academic environment. Second, universities should consider integrating environmental sustainability and green principles into their curricula. This could involve incorporating sustainability topics into course materials, supporting student-led green innovation initiatives, and introducing role models who actively demonstrate green practices. Moreover, offering hands-on environmental experiences—such as internships or campus sustainability projects—can further engage students. These strategies will not only enhance students' interest in green development but also nurture their green thinking, leading to increased participation in environmental innovation.

7. Limitations and Future Research

Although this study provides valuable theoretical and practical insights, it has some limitations. First, the cross-sectional design of the data collection restricts the ability to make causal inferences. Future research could address this limitation by using longitudinal studies to better understand the causal relationships between PGIL, GT, and GCRY. Second, the sample was limited to college students from higher education institutions in Hebei Province, China. To improve the generalizability of the findings, future studies should replicate the model in different geographical regions and across various educational contexts. Third, this study focused exclusively on GT as a mediating variable. Future research could explore additional mediators that may influence the relationship between PGIL and GCRY.

Conflict of Interest Statement

The authors declare that the research was conducted without any commercial or financial relationships that could be interpreted as potential conflicts of interest.

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