Effect of Creative Self-Efficacy on Creativity among College Students: The Moderating Effect of College Innovation Climate

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Received: August 14, 2023 Accepted: September 5, 2023 Online Published: September 8, 2023

doi:10.5430/ijhe.v12n5p128 URL: https://doi.org/10.5430/ijhe.v12n5p128

Abstract

Creativity is one of the five core competencies in the twenty-first century, and increasing attention has been paid to creativity development among students worldwide. Higher education institutions play a vital role in fostering creativity among university students. The present study examines the effect of creative self-efficacy and the college innovation climate on creativity of university students through the lens of social cognitive theory. A total of 573 questionnaires were collected from students at five universities in Hebei, China; the resulting data were analyzed through hierarchical regression analysis. The results confirmed that creative self-efficacy has a significant effect and that college innovation climate has a significant positive effect on university students' creativity. Furthermore, the study revealed the moderating effect of the college innovation climate on the relation between creative self-efficacy and creativity. These findings offer theoretical and practical insights for enhancing creativity among university students.

Keywords: university students' creativity, college innovation climate, creative self-efficacy, hierarchical regression

1. Introduction

Creativity has been recognized as one of the five core competencies in the twenty-first century and has garnered increasing attention worldwide for its role in economic development (Hernández-Torrano & Ibrayeva, 2020; Shi et al., 2020). Education plays a vital role in nurturing creativity, and the development of creative talents for the good of a country has become a major mission for higher education institutions (Jahnke et al., 2017; Wang et al., 2022). To contribute to national economic development, higher education incorporates creativity education and creates conducive conditions for it through innovative talent development and curriculum reform. Therefore, the university education phase has become a critical stage in development of students' creativity (Egan et al., 2017). The intellectual climate of the university where creativity education is provided plays a crucial role in determining the development of college students' creativity (Livingston, 2010).

Shi et al. (2020) define creativity as the ability to generate novel and valuable ideas; higher education institutions play a crucial role in fostering innovation by promoting creativity among students. From a cognitive perspective, Chen et al. (2022) observed a close relation between the creativity of university students and their cognitive flexibility. Some studies have revealed that the creativity level of most university students is lower than expected, and the development of innovative talents in higher education institutions is often superficial. Therefore, it is essential to explore factors influencing the formation and development of creativity and its underlying mechanisms (Da Costa et al., 2015; Wang et al., 2022).

Creativity stems from the interaction of personal and environmental factors. Higher education institutions can thus positively influence the creativity of students by encouraging innovation (Zhang et al., 2022). Through the process of learning and internalizing of knowledge within specific domains, individuals develop cognition of domain knowledge, motivation, belief, and confidence which referred to as self-efficacy (Haase et al., 2018; Hahn & Lee, 2017). Creative self-efficacy, as identified by Tierney and Farmer (2002), refers to people's confidence in their ability to produce creative products or performances when faced with creative tasks. It is a factor influencing creativity (Wang et al., 2013; Zhang & Zhou., 2017). Creative self-efficacy enhances students' confidence in engaging in creative activities and serves as a positive predictor of creativity (Chen & Zhang, 2019; Zhang et al., 2022).

Social cognitive theory highlights the ternary interaction among individuals, their behaviors, and the environment, wherein individual behaviors are influenced by the interaction between the other two factors (Bandura, 1977). Hunter et al. (2007) proposed that creativity emerges through the interaction of people with their environments. Creativity flourishes in a positive environment that fosters and values originality. The concept of a creative climate refers to the subjective experience of organization members within their innovation-driven climate, which acts as an environmental factor influencing creativity (Amabile et al., 1996) or, more broadly, as an influencing factor (Hsu & Chen, 2017). Amabile (1988) emphasized the positive effect of a creative climate on creativity. In the context of the university, creative climate plays a vital role in shaping creativity development among students (Li & Liu, 2016). A favorable climate, coupled with engaging creative activities, nurtures students' creativity by stimulating divergent thinking and cultivating individual interests (Li & Cao, 2021).

Creativity is a result of the interaction between individuals and their environment; education is a context that plays an important role in fostering creativity (Anjum et al., 2021). Creative self-efficacy has been identified as a positive predictor of creativity (Puente-Díaz & Cavazos-Arroyo, 2017). In addition, environmental factors considerably effect students' creativity (Amabile, 1996). The level of support for innovation provided by higher education institutions and the college innovation climate strongly correlate with college students' creativity. A more robust college innovation climate can effectively facilitate the development of creativity among college students (Zhou & Xing, 2018).

The effect of creative climate on creativity has been found to be subtle but significant (Zheng et al., 2022). However, the existing literature on the effect of creative climate on creativity has primarily focused on organizations and enterprises (Qammar & Abidin, 2020; Zheng et al., 2022), with limited coverage in the field of education, specifically regarding university students. Therefore, this study uses the framework of social cognitive theory to explore the effects of creative self-efficacy and college innovation climate, and their interaction in fostering creativity among college students.

2. Literature Review

2.1 Basis of Research

Social cognitive theory suggests that there are ternary and dynamic interactions among individuals, their behaviors, and the environment, emphasizing the influence of personal factors and the environment on individual behavioral outcomes (Bandura, 1977). The effect of environmental factors on behavioral factors remains latent until they interact with personal factors and are triggered by corresponding behaviors (Bandura, 1986). Creativity, as a product of the interaction between individuals and their environment, is highly influenced by the environment (Anjum et al., 2021). Wang et al. (2021) explored the role of creativity in entrepreneurship education from the perspective of social cognitive theory (Nwosu et al., 2022). Peng et al. (2019) used social cognitive theory to analyze the factors affecting creativity. Self-efficacy, a core concept in social cognitive theory, has been found to positively affect employee creativity (Maria et al., 2022). Zeng et al. (2021) established a close relation between self-efficacy and university students' creativity, with creative self-efficacy serving as a mediating factor between teachers' responses and university students' creativity (Zhang et al., 2022). Wang et al. (2022) opined that personal factors and educational environment factors affect the development of creativity among students. Drawing from social cognitive theory, the present study explores the effect of creative self-efficacy and college innovation climate on creativity, considering creative self-efficacy as a personal factor, the college innovation climate as an environmental factor, and creativity as a behavioral outcome.

2.2 Effect of Creative Self-Efficacy on Creativity

Given their mature mindsets, intelligence, and awakened innovative thinking, university students are in a prime stage of their lives for creativity development. These qualities enable them to explore new things and embrace challenges with confidence. The university phase thus becomes a critical time for nurturing and enhancing creativity through education. In the context of university students, creativity encompasses the ability or characteristics to utilize existing knowledge and generate novel and unique outcomes, whether in a spiritual or material form, that hold social or personal value and serve a specific purpose (He et al., 2015; Sternberg & Lubart, 1991). This study defines creativity as the ability of college students to use known information based on a specific goal to create a mental or material product that is novel, unique, and of social or personal value (He et al., 2015; Sternberg & Lubart, 1991). The development of creativity among university students relies on both personal and environmental factors (Said-Metwaly et al., 2017; Sternberg, 2018).

Among various personal factors, self-efficacy of individuals is particularly important in terms of the development

and improvement of individual creativity (Sternberg & Williams, 1996). Tierney and Farmer (2002) identified creative self-efficacy as a highly reliable predictor of individual creative performance, as it reflects an individual's belief in their capacity to generate creative products or performances when faced with tasks requiring creativity. Mathisen and Bronnick (2009) highlighted the impact of creative self-efficacy on individuals' beliefs about creativity, suggesting that improvements in creative self-efficacy can lead to improved perception of one's creative abilities. Studies have demonstrated a close correlation between creative self-efficacy and individual creativity (Chen et al., 2022; Gong et al., 2009). Creative self-efficacy can transform an individual's creative ideas into creativity under certain conditions (Arshad et al., 2021). A high level of creative self-efficacy is necessary condition for creativity to emerge (Chuang et al., 2010). Puente-Díaz and Cavazos-Arroyo (2017) emphasized that creative self-efficacy can be regarded as a positive predictor of creativity, and creativity can serve as an outcome variable of creative self-efficacy. Moreover, creative self-efficacy has been identified as a positive predictor of employee creativity (Chen & Zhang, 2019). Based on the aforementioned studies, Hypothesis 1 is proposed.

H1. Creative self-efficacy significantly and positively affects creativity.

2.3 Effect of College Innovation Climate on Creativity

Amabile (1996) highlighted the importance of the environment as a crucial influencing factor in fostering creativity. The organizational creative climate is an objective environmental factor that influences creative activities and serves as a predictor of creativity (Hsu & Chen, 2017). The college innovation climate is an application of the organisational innovation climate in higher education. Xia et al. (2019) extended the aforementioned concept to the realm of school education, defining the college innovation climate as the perception held by school members regarding the orientation, characteristics, and support for innovation within the school and suggesting that it greatly impacts innovation behaviors. A favorable college innovation climate plays a vital role in the development of creativity, as it, along with creative activities within the university, nurtures students' divergent thinking abilities (Li & Cao, 2021). Tran et al. (2021) asserted that creative self-efficacy, knowledge sharing, and creative climate significantly influence employee creativity. Furthermore, the college innovation climate perceived by art students may positively affect their artistic creativity, with a more favorable creative climate acting as a stimulant (Wang & Tien, 2023). Therefore, Hypothesis 2 is proposed:

H2. College innovation climate significantly and positively affects creativity.

2.4 College Innovation Climate as a Moderator between Creative Self-Efficacy and Creativity

Bandura (1986) emphasized dynamic interaction between individuals and their environment, highlighting how individuals can adjust their behavioral responses based on environmental conditions. Studies have revealed the significant effects of creative self-efficacy on creativity (Zhang & Zhou, 2017). As with creative self-efficacy, creativity is influenced by environmental conditions as it emerges through the interaction among individual cognition, beliefs, and the environment (Chong & Ma, 2010). The organizational environment is a key factor for fostering creativity (Amabile, 1996). Jafri et al. (2016) observed the role of organizational creative climate in moderating the relation between emotional intelligence and creativity, suggesting that a more favorable creative climate strengthens the impact of emotional intelligence on creativity. Wang and Rode (2010) discovered the moderating effect of the organizational creative climate among leaders' recognition, transformational leadership, and creativity. When leaders recognize their employees appropriately, a more favorable creative climate enhances the relation between transformational leadership and creativity than a mediocre climate does. Chen et al. (2020) examined the moderating effect of the organizational creative climate and revealed that a favorable climate influences employees' perception of the usefulness and feasibility of their innovative ideas and opinions, thereby stimulating their innovative behaviors. A college's innovation climate represents an example of the organizational creative climate in the context of school education. Xia et al. (2019) extended the aforementioned concept to the domain of school education. Accordingly, Hypothesis 3 is proposed as follows:

H3. College innovation climate moderates the relation between creative self-efficacy and creativity.

3. Methodology

3.1 Research Framework

This study utilized social cognitive theory to explore the effect of college students' creative self-efficacy and the college innovation climate on their creativity. The hypotheses proposed in the study were tested by analyzing the questionnaire data through hierarchical regression. Figure 1 presents the research framework.

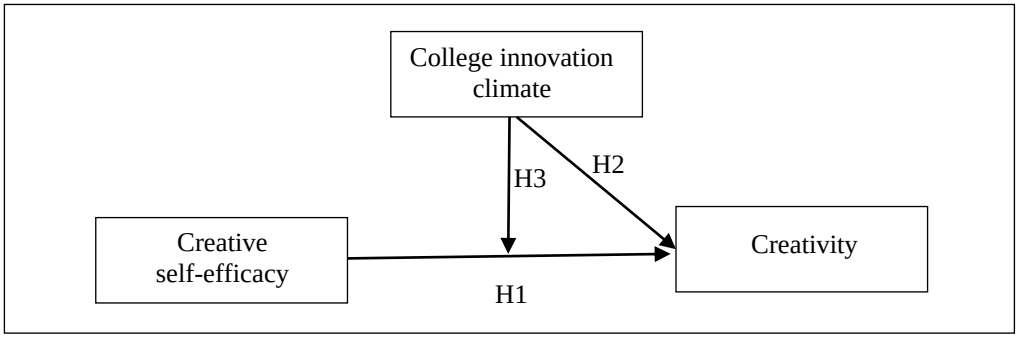

Figure 1. Research framework

3.2 Research Object

In the context of the Beijing–Tianjin–Hebei economic circle, Hebei Province is actively promoting school–enterprise cooperation and recognizing the significance of creativity in facilitating economic development. The region is transitioning from being input-dependent to fostering an intensive economy. To investigate the effect of creative self-efficacy and college innovation climate on creativity, the author conducted a preliminary survey of 170 students from five universities in Hebei Province, China. In the formal survey, convenience sampling was employed to collect 600 questionnaires from students at these universities. The universities included two in Shijiazhuang, one in Baoding, one in Cangzhou, and one in Hengshui, with 120 students selected from each university. Among the collected questionnaires, 27 were considered invalid and hence excluded; in the end, 573 questionnaires were deemed valid and used to analyze the effect of creative self-efficacy and college innovation climate on creativity.

3.3 Research Tools

3.3.1 Creativity Scale

Guilford (1968) argued that divergent thinking ability is an important component of creativity. Sternberg and Lubart (1991) posited that intellectual factors and personality traits—e.g., tolerance for ambiguity, self-confidence, and others—are closely related to creativity. Kaufman and Plucker (2011) argued that intellectual factors are a part of creativity. Silvia (2015) proposed that students with high intelligence and creativity have a unique advantage in the classroom. Creativity among college students is not only closely related to thinking, but may also be inextricably linked to intelligence and environmental factors (Said-Metwaly et al., 2017).

This study utilized the University Student Creativity Scale developed by He et al. (2015), comprising 16 questions encompassing three dimensions: divergent thinking, use of intelligence, and personality factors. A reliability analysis was conducted on the preliminary survey data, resulting in a Cronbach's alpha coefficient of 0.867, which exceeded the threshold of 0.7, thereby confirming the questionnaire's reliability. Confirmatory factor analysis was performed on the formal questionnaire data to test the structural validity of the scale. The factor loads for all the questions ranged from 0.672 to 0.875, and the combined reliability (CR) fell within the range of 0.758–0.916, all exceeding the threshold of 0.6 (Fornell & Larcker, 1981). Regarding the overall fitness indices of the scale, the following values were obtained: χ^2/df = 2.195, RMSEA = 0.046, RMR = 0.041, SRMR = 0.031, GFI = 0.954, AGFI = 0.938, RFI = 0.95, NFI = 0.95, CFI = 0.976, and TLI = 0.972. All these values exceeded 0.9. In addition, PNFI = 0.806 and PCFI = 0.822, both exceeding 0.5, which indicated that the scale has good model fit.

3.3.2 Creative Self-Efficacy Scale

The study also utilized the Creative Self-Efficacy Scale developed by Hung et al. (2008), comprising 14 questions encompassing three dimensions: belief in strategies for creative thinking, belief in creative products, and belief against negative comments. During the item analysis conducted on the preliminary survey data, the fourth question of the second and third dimensions was found to be unsatisfactory based on the reference standard and was subsequently omitted. Furthermore, reliability analysis was performed, resulting in a Cronbach's alpha coefficient of 0.813, surpassing the threshold of 0.7 and confirming the questionnaire's reliability. To assess the structural validity of the formal questionnaire, confirmatory factor analysis was employed. The factor loads for all the questions ranged from 0.649 to 0.833, and the CR fell within the range of 0.795–0.843, all exceeding the threshold of 0.6. Regarding the overall fit indices of the scale, the following values were obtained: χ^2/df = 2.173, RMSEA = 0.046, RMR = 0.029, SRMR = 0.033, GFI = 0.969, AGFI = 0.952, RFI = 0.945, NFI = 0.958, CFI = 0.977, and TLI = 0.970. All the values

exceeded 0.9. In addition, PNFI = 0.740 and PCFI = 0.755, both exceeding 0.5, indicating that the scale exhibits acceptable fitness for the model.

3.3.3 Scale for College Innovation Climate

Lastly, this study utilized the Scale for College Innovation Climate developed by Xia et al. (2019), comprising 12 questions encompassing three dimensions: support from other students, support from teachers, and support from the university. Furthermore, reliability analysis conducted on the preliminary survey data, which resulted in a Cronbach's alpha coefficient of 0.972, confirming the questionnaire's reliability. Confirmatory factor analysis was performed to assess the structural validity of the formal questionnaire. The factor loads for all the questions ranged from 0.601 to 0.911, and the CR fell within the range of 0.795–0.841, all exceeding the threshold of 0.6. Regarding the overall fit indices of the scale, the following values were obtained: χ^2/df = 2.009, RMSEA = 0.042, RMR = 0.039, SRMR = 0.030, GFI = 0.971, AGFI = 0.956, RFI = 0.956, NFI = 0.966, CFI = 0.982, and TLI = 0.977. All these values exceeded 0.9. Furthermore, PNFI = 0.746 and PCFI = 0.759, both exceeding 0.5, which indicated that the scale has a good model fit.

4. Findings

4.1 Test of Common Method Biases

In this study, Harman's single-factor test was utilized to assess the presence of common method bias. Accordingly, 40 questions from the scale, covering creative self-efficacy, college innovation climate, and creativity, were included in the analysis. The analysis yielded a total of nine factors (with the axis not rotated) and accounted for a cumulative explanatory variation of 65.887%. The explanatory variation of the first factor was found to be 21.939%, which was lower than the reference standard of 50%. This result indicated that the level of common method bias was acceptable (Podsakoff et al., 2003). The presence of such bias does not pose a challenge to the data-based analysis of the relation among creative self-efficacy, college innovation climate, and creativity.

4.2 Descriptive Statistics

Convenience sampling was employed to select 600 students from five universities in Hebei Province to answer the questionnaire. Of the total questionnaires recovered, 573 were considered valid, resulting in an effective collection rate of 95.5%. Table 1 presents the distribution of the sample data in terms of gender and academic year. In the preliminary survey, the sample comprised 225 (39.3%) males and 348 (60.7%) females. Regarding the distribution by academic year, there were 220 (38.4%) freshmen, 153 (26.7%) sophomores, 101 (17.6%) juniors, and 99 (17.3%) seniors.

Table 1. Descriptive Statistical Analysis

Variable	Choice	Number of people	Percentage
Gender	Male	225	39.3%
	Female	348	60.7%
Grade	Freshman	220	38.4%
	Sophomore	153	26.7%
	Junior	101	17.6%
	Senior	99	17.3%

4.3 Variable Correlation Analysis

Pearson correlation analysis was employed to determine the correlation among variables. The mean values and standard deviations of the variables, as well as the correlation analysis results are presented in Table 2. A 5-point Likert scale was used for measuring college innovation climate and creativity, whereas a 4-point Likert scale was used for assessing creative self-efficacy. The mean values for creative self-efficacy, college innovation climate, and creativity were 3.250, 3.211, and 3.432, respectively. All mean values exceeded the intermediate level, indicating that university students possess a certain degree of creativity. The correlation analysis results revealed a significant positive correlation between creative self-efficacy and college innovation climate ($r = 0.143$, $p < 0.01$), creative self-efficacy and creativity ($r = 0.383$, $p < 0.001$), and college innovation climate and creativity ($r = 0.239$, $p < 0.001$). The variables were significantly positively correlated and exhibited a low to moderate degree of correlation. Moreover, multicollinearity among the variables was not observed.

Table 2. Descriptive Statistics of Variables and Correlation Analysis

Variable	M	SD	Creative self-efficacy	College innovation climate	Creativity
Creative self-efficacy	3.250	0.585	1		
College innovation climate	3.211	0.727	0.143**	1	
Creativity	3.432	0.771	0.383***	0.239***	1

Notes: **p < 0.01 ***p < 0.001

4.4 Hierarchical Regression

Abraham (2016) observed that creativity significantly varies between male and female students and explained the cognitive differences between them. Alacapinar (2013) posited that students in different academic years exhibit different levels of creativity. With that in mind, this study employed hierarchical regression analysis to examine the relation among creative self-efficacy, college innovation climate, and creativity while controlling for gender and academic year. The results are presented in Table 3, which indicates that in Model 1, the regression equation yielded an F value of 48.504 ($p < 0.001$), indicating that the regression equation was significant. This equation explained 30% of the total variance. The regression coefficient β for the effect of creative self-efficacy on creativity was 0.229, with a t value of 6.106 ($p < 0.001$). The finding demonstrated a significant positive effect of university students' creative self-efficacy on creativity, thereby supporting Hypothesis 1.

In Model 2, after including the moderating variable of college innovation climate, the explanatory power of the equation increased from 3.6% to 33.6%. The regression coefficient β for the effect of college innovation climate on creativity was 0.200, with a t value of 5.550 ($p < 0.001$). The result indicated a significant positive effect of the college innovation climate on creativity, thereby supporting Hypothesis 2. In Model 3, variation inflation factor (VIF) values for all the variables were lower than 10, suggesting the absence of collinearity. The F value of the equation was 45.634, with a significance level of $p < 0.001$, indicating that the regression equation was significant. Moreover, the explanatory power of the equation increased from 2.5% to 36.1% relative to that in Model 2. The regression coefficient β for the interaction term between creative self-efficacy and college innovation climate was 0.163, with a t value of 4.743 ($p < 0.001$). The finding confirmed the role of college innovation climate as a moderator between creative self-efficacy and creativity, providing support for Hypothesis 3.

Table 3. Summary of Hierarchical Regression Analysis of the Moderating Role of College Innovation Climate on the Effect of Creative Self-Efficacy on Creativity

Variable	Model 1		Model 2		Model 3		
	Beta	t	Beta	T	Beta	t	VIF
Gender (male)	0.142	4.022***	0.091	2.541*	0.104	2.956**	1.095
Grade(sophomore)	0.178	4.525***	0.193	5.017***	0.162	4.251***	1.290
Grade (Junior)	0.353	8.691***	0.370	9.321***	0.364	9.356***	1.341
Grade (senior)	0.369	9.124***	0.376	9.547***	0.363	9.349***	1.331
Creative self-efficacy	0.229	6.106***	0.199	5.306***	0.204	5.552***	1.197
College innovation climate			0.200	5.550***	0.189	5.336***	1.112
Creative self-efficacy * College innovation climate					0.163	4.743***	1.038
R^2	30.0%		33.6%		36.1%		
$\triangle R^2$	-		3.6%		2.5%		
F	48.504***		47.678***		45.634***		

Notes: *p < 0.05 **p < 0.01 ***p < 0.001. The female group and freshman group were taken as the reference for the variables gender and academic year, respectively.

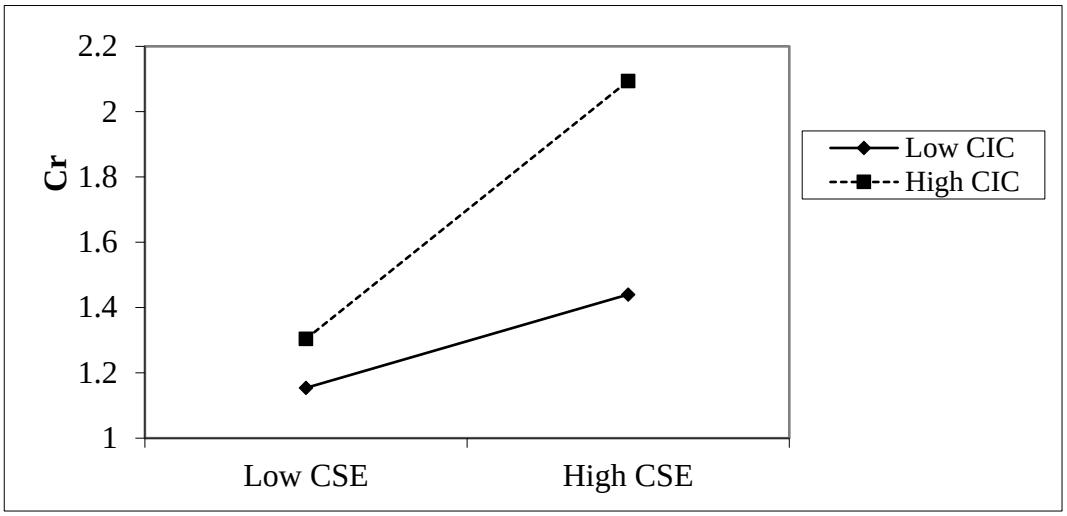

Figure 2. Moderating Effect Diagram

Figure 2 shows the moderating effect diagram created using the simple slope method. The results of the analysis support the role of college innovation climate as an enhancer between creative self-efficacy and creativity of university students. Specifically, the effect of creative self-efficacy on creativity is amplified for students studying in a university with a more favorable creative climate.

5. Discussion

5.1 Significant Positive Effect of Creative Self-Efficacy on Creativity

The research results revealed a significant positive effect of creative self-efficacy on creativity among university students, which aligns with the findings of Chen and Zhang (2019). The results indicated that the higher levels of creative self-efficacy of a university, the higher levels of college students' creativity. Haase et al. (2018) proposed that creative self-efficacy is strongly associated with creativity, with the former serving as a positive predictor of the latter (Puente-Díaz & Cavazos-Arroyo, 2017). In line with social cognitive theory, individual motivation is influenced by one's belief in their ability to perform specific tasks (Bandura, 1977). High self-efficacy is particularly crucial for producing creative output and acquiring new knowledge in individual creative activities (Karwowski, 2012).

Mathisen and Bronnick (2009) emphasized the relation between creative self-efficacy and an individual's belief in their creativity. They suggested that enhancing creative self-efficacy can lead to increased confidence in engaging in creative activities and solving problems creatively. This heightened confidence enables university students to overcome difficulties and stimulate their creativity.

5.2 Significant Positive Effect of College Innovation Climate on Creativity

The research results indicated a significant positive effect of college innovation climate on creativity among university students. These results support the conclusions drawn by Wang and Tien (2023), who observed that a favorable college innovation climate strongly affects creativity. The college innovation climate in the university, where students spend a significant portion of their lives, plays a crucial role in fostering creativity. Both a favorable climate and the organization of creative activities contribute to enhancing students' creativity (Zhou & Xing, 2018). As an external motivating factor, a favorable college innovation climate is more likely to stimulate creativity among university students (Wang & Tien, 2023).

5.3 College Innovation Climate as a Moderator between Creative Self-Efficacy and Creativity

The study results support the findings of Wang and Rode (2010), indicating that the college innovation climate serves as a moderator between creative self-efficacy and creativity of students. According to social cognitive theory, individuals' behavior is influenced by the interaction between personal cognition, beliefs, emotions, and the surrounding environment, which includes factors such as social support or culture, and the environmental variables can be effective only in the presence of individuals' cognition and beliefs, which would have an impact on creativity (Bandura, 1989). Creativity is supported by the interaction among individuals' perceptions, belief, and the environment (Chong & Ma, 2010), and creative climate is often used as a parameter for evaluating the environmental

context (Hunter et al., 2007). The organizational creative climate has been shown to be an effective predictor of creativity, and research in this area can provide valuable insights for organizations seeking to enhance creativity (Hsu & Chen, 2017; Jaiswal & Dhar, 2015). Jafri et al. (2016) determined that the organizational creative climate acts as a moderator between emotional intelligence and employee creativity; in a positive climate, the impact of emotional intelligence on employee creativity is the strongest. Similarly, Li and Cao (2021) found that the college innovation climate significantly influences students' creativity. Factors such as the development of divergent thinking, stimulation of interests, utilization of diverse resources, and active involvement in creative activities contribute to the development of students' creativity.

6. Conclusion and Suggestions

The present study results indicated that creative self-efficacy in university students significantly positively affects their creativity. Stronger creative self-efficacy is more likely to foster creativity, as it serves as an internal motivator for creativity (Puente-Díaz & Cavazos-Arroyo, 2017). Therefore, enhancing university students' creative self-efficacy is crucial to improving their creativity. Hung et al. (2008) demonstrated the influence of positive feedback from key individuals on university students' creative self-efficacy. Therefore, lecturers should provide timely feedback to students' innovative ideas, affirm and objectively comment on their new ideas, and encourage them to implement their innovative ideas. By doing so, lecturers can enhance students' confidence in generating new products and realizing their ideas, thereby stimulating their creativity. It follows that universities should provide rewards and recognition for lecturers and students who have made innovative achievements to promote and incentivize innovation; such external support can enhance students' creative self-efficacy, and thus further stimulate their creativity.

The study findings suggested that a college's innovation climate acts as a moderator between creative self-efficacy and students' creativity. A favorable creative climate enhances the effect of creative self-efficacy on students' creativity. Therefore, universities should create a favorable creative climate as an external stimulant for students' innovation and creativity. To foster a positive college innovation climate, we make the following proposals: (a) Universities can design and offer creativity courses. Additionally, organizing competitions (e.g., a "Challenge Cup" or modeling contest) and launching innovation projects can enhance students' participation and promote their creativity. (b) Universities should develop incentive policies that guide and encourage innovation among students, which might include providing rewards or recognition for creative activities and considering innovation outcomes as a criterion for granting awards or admission to programs. (c) Universities and colleges should ensure that students have access to abundant resources and opportunities for engaging in creative activities that involve interaction with students from other majors or universities. This exposure allows students to deepen their understanding of creativity and provides them with role models to inspire their creative pursuits.

Creative self-efficacy functions as an internal motivator for creativity, whereas the college innovation climate represents an external factor. According to social cognitive theory, individual behavior is influenced only when the internal and external factors interact (Bandura, 1986). Therefore, to enhance university students' creativity, it is essential to provide stimuli from both internal and external sources. Internally, lecturers need to encourage students to engage in innovative activities and build their confidence that they can realize their creative ideas (creative self-efficacy). Externally, universities should focus on improving the college innovation climate.

7. Research Limitations and Future Directions

This study has limitations in terms of the content and sample. To ensure more universal conclusions, future studies should expand the scope of sampling. In addition, studies can incorporate more influencing factors, such as teacher leadership, to enrich research findings, thereby providing a more comprehensive and nuanced basis for promoting university students' creativity.

8. Ethics Approval

The design of this study was approved by Chinese International College of Dhurakij Pundit University. Participants had understood the purpose of the study, and their participation in this study was voluntary. All data of the study were handled confidentially and will be used for research purposes only.

Acknowledgements

First, I would like to thank my supervisor, Yuan-Cheng Chang, for his guidance in writing my dissertation, which is a way for me to continuously improve my writing. Second, I would like to thank my classmates who participated in my research as well as my friends and teachers who helped me in the questionnaire survey; their participation made my research more rigorous. Finally, I would like to thank my classmate Gao Hu for giving me valuable suggestions

in the submission and translation.

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