

How Does Creative Learning Environment Foster Student Creativity? An Examination on Multiple Explanatory Mechanisms

Mudan Fan^{1, a, *}

¹School of Education, Weinan Normal University. Weinan ,Shaanxi ,P.R. China

^a454211489@qq.com

*Corresponding author

Keywords: Creative learning environment, Learning goal orientation, Network ties, Knowledge sharing, Student creativity.

Abstract. Drawing on Amabile's componential theory of creativity, the present research aims to test how a creative learning environment can foster undergraduate creativity through three distinct mechanisms (i.e., learning goal orientation, network ties, and knowledge sharing). A total of 431 students and their teacher from a Chinese university completed questionnaires. The results generally supported the theoretical model in which a creative learning environment is significantly associated with student creativity by enhancing students' learning goal orientation, network ties, and knowledge sharing.

Introduction

Creativity is becoming increasingly important in modern society [1-3]. Specifically, as students are the key driver of societal development, universities around the world have been taking on the mission of fostering creative individuals and producing creativity. Accordingly, researchers and educators are attempting to identify predictors that facilitate student creativity, such as teacher behaviors (e.g., encouragement and other teacher behaviors [4]. More recently, researchers have begun investigating the role of the classroom environment [5]. Notably missing from the literature is a thorough examination of the creative learning environment, despite suggestions by scholars student creativity can be nurtured by educators who focus greater effort on building a learning environment that highlights the value of creativity [2, 6]. Therefore, a major purpose of this study is to address the connection between a *creative learning environment* and student creativity by identifying several important intervening mechanisms. Figure 1 shows the hypothesized model.

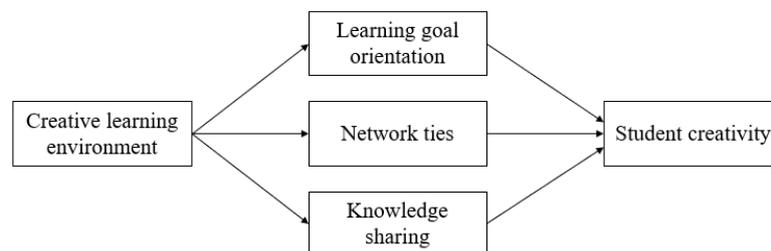


Fig. 1 The hypothesized model

In building a model linking a creative learning environment and creativity, we further draw on the dynamic componential theory of creativity [7], which suggests that desirable contexts can induce creativity by influencing multiple personal motivations and behaviors. This foundational theory highlights the exploration of personal motivations and social exchanges as mediators in creativity research. Thus, I propose three mediating mechanisms with high potential to help explain the linkage: *learning goal orientation*, *network ties*, and *knowledge sharing*. Specifically, learning goal orientation, referring to students who believe in learning, understanding, and development as ends in themselves, illustrates students' internal motivation in seeking knowledge to produce creative outputs.

Network ties represent students' relations with their teachers and classmates within an academic environment [8], which was found not only to be composed of factors in class but also to impact students' outcomes. Finally, encouraging personal interactions was highly recommended by educators because students can benefit more from diverse knowledge exchange in generating creativity [9]. Taken together, we propose that learning goal orientation, network ties, and knowledge sharing can mediate the relationship between student creativity and a creative learning environment.

Literature Review and Hypotheses Development

Creative Learning Environment and Student Creativity

There is reasonable evidence from a number of studies indicating that creativity can be stimulated by contextual factors [10]. Among such factors as classroom interaction and teachers' positive behaviors and attitudes [1], an important characteristic of teachers is strong facilitation skills. That is, teachers as supportive facilitators can inspire students to become intellectual risk-takers and creative problem solvers. Consistently, scholars suggest that creative learning is a key element in the creative process [11]; thus, students need to be provided creative learning opportunities in the classroom environment [2]. Thus, school environments that support and actively accelerate students' creative expression can promote students' engagement in creative activities [5, 6].

Based on the arguments above, the present study proposes a specific learning environment—i.e., creative learning environment—that may directly boost students' creativity. A creative learning environment in class is characterized as valuing ideas, indicating that students are not only allowed but also encouraged to take sensible risks and make mistakes during the learning process [12]; therefore, students are highly supported in reaching their creative potential [4]. For example, in a review of a classroom learning environment, researchers found that when studying in a creative learning environment at school, students are likely to continue to develop their skills and professional knowledge, which significantly spurs the development of their creative responses [6]. As a result, students have more creative achievements [12].

Hypothesis 1. Creative learning environment is positively related to student creativity.

Learning Goal Orientation as A Mediator

Goal orientation is the reason or purpose for a person's involvement in tasks [13]. Importantly, as a key dimension of individual goal orientation, learning goal orientation has been found to form in favorable environments and to benefit individuals' processes of producing creative outcomes [13, 14]. Considering the conceptual and empirical evidence, we propose learning goal orientation as a mediator in the relationship between student creativity and a creative learning environment. Since a creative learning environment is characterized as providing support and resources [6], individuals are given more opportunities to become interested in and enjoy a learning activity. Thus, when learning in this situation, it is emphasized that students can extend their abilities through greater effort (and can seek out opportunities to practice and improve their skills [15], leading to greater achievement. Moreover, as learning and developing new knowledge are essential to being creative in class, scholars have claimed that an individual's learning goal orientation can stimulate actions to improve his or her creative competencies [16]. That is, students who have a strong learning goal orientation act more proactively and respond positively to problems and challenges through their knowledge of learning [4]. Consequently, these students may experience higher levels of internal motivation to devise creative ideas [17]. Thus, we hypothesize a mediating effect of learning goal orientation in the relationship between creativity and a creative learning environment.

Hypothesis 2. Learning goal orientation mediates the relationship between creative learning environment and student creativity.

Network ties as A Mediator

Research has indicated that students' social capital is an important asset to promote their creativity [18]. Specifically, social capital emphasizes personal interactions in terms of social ties [19]. Scholars

specify that creating a creative learning environment in the classroom can promote interaction among students because they can observe an open mindset and good communication climate [12]. Thus, the space within a classroom that is capable of being used flexibly to promote students' learning can contribute to building their network ties. Moreover, when students build personal ties within their surroundings (e.g., with classmates), they are more willing to make contact with other students because of their common interests in the classroom [20], which eventually increases their ability not only to solve problems but also to reformulate problems and solutions creatively. Hence, the mediator of network ties is proposed in the relationship between creativity and a creative learning environment.

Hypothesis 3. Network ties mediates the relationship between creative learning environment and student creativity.

Knowledge Sharing as A Mediator

Knowledge sharing is generally defined as activities through which various types of knowledge (e.g., information and skills) is exchanged and disseminated among people, units, communities, and/or organizations [21]. Previous education literature has significantly highlighted the importance of knowledge sharing in the classroom [18]. Specifically, when students are studying in a learning environment characterized as having supportive relationships between teachers and learners, students are more likely to interact with others in the group and to share knowledge and experiences, thus enhancing their performance in class [18]. We therefore propose a positive effect of a creative learning environment on student knowledge sharing. Moreover, previous research has suggested that the more knowledge is shared, the more nonoverlapping information emerges from other students within the group [8, 18]. In this situation, students can receive the benefits of collective wisdom, which provides information contributing to their explicit knowledge and subsequently enhancing their creativity [3]. Therefore, we argue that when students are in an environment conducive to creative learning, they are more willing to share knowledge with their classmates and therefore have more opportunities to access diverse knowledge and information stimulating creative solutions.

Hypothesis 4. Knowledge sharing mediates the relationship between creative learning environment and student creativity.

Method

Sample and Procedure

The participants in the current research were 431 undergraduates in their third year of studies and their teachers from a university in the central region of P.R. China. The participants were completely unaware of the goals and aims of the research, and they did not have any prior training in creativity. The teacher in the class announced that all the questionnaires were confidential and would be used only for research. None of the items on the scale had correct answers; the students were to answer each item according to their own perceptions. Subsequently, the teachers rated each student's creativity. In total, 69.7% of the students were female; 41.8% of the students majored in tourism management, and 58.2% majored in business administration.

Measurements

All the variables are assessed with 5-point Likert-type scale (1 = totally disagree; 5 = totally agree). We used the back-translation procedure [22] to translate the English version into a Chinese version. Specifically, creative learning environment was adapted from ref and measured using fourteen items to portray students' perceptions of the creative learning environment in the class. An example of items is "Multiple ways of knowing and learning are encouraged in class". Moreover, following previous studies [15], the scale with four items adapted [23] was used to assess students' learning orientation. An example of items is "In class I want to learn something new". Regarding to measuring knowledge sharing, a 3-item scale [3] was used to. "In my class I know who I can contact for specific questions," is an example of a question from this measure. Additionally, reflecting students' creativity-enhancing network activities with their classmates, network ties was assessed by a

three-item scale [8]. An example of items is “In general, I have a very good relationship with my classmates”. The teacher was asked to rate student creativity with a 4-item creativity scale [24]. An example of items is “This student seeks new ideas and ways to solve problems”. We finally controlled for students’ age (in years) and their major (1 = education; 2 = psychology).

Results

Before testing hypotheses, we conducted a confirmatory factor analysis to examine discriminate validity through using AMOS 21.0. The results show that the hypothesized five-factor model provided a better fit to the data ($\chi^2[198] = 323.82$, CFI = 0.99, TLI = 0.98, RMSEA = 0.04) than other alternatively models: three-factor model combining network ties and knowledge sharing ($\chi^2[236] = 1748.77$, CFI = 0.84, TLI = 0.81, RMSEA = 0.12), two-factor model combining learning goal orientation, network ties, and knowledge sharing ($\chi^2[238] = 1931.58$, CFI = 0.82, TLI = 0.79, RMSEA = 0.13), and the one-factor model combining all the variables ($\chi^2[241] = 2444.94$, CFI = 0.77, TLI = 0.73, RMSEA = 0.15). Table 1 shows the descriptive statistics, bivariate correlations, and Cronbach’s alphas for all the variables.

Table 1. Means, standard deviations, and zero-order correlations between study variables

	Mean	SD	1	2	3	4	5	6	7
1.Gender	1.70	0.47							
2.Major	1.58	0.49	0.04						
3.Creative learning environment	3.77	0.96	0.11*	0.07	(0.91)				
4.Learning goal orientation	4.16	1.14	0.05	0.05	0.39**	(0.90)			
5.Network ties	4.07	1.19	0.03	-0.00	0.25**	0.47**	(0.92)		
6.Knowledge sharing	4.08	1.10	0.12*	0.07	0.16**	0.19**	0.34**	(0.88)	
7.Creativity	4.15	1.03	0.06	0.19	0.37**	0.28**	0.46**	0.58**	(0.86)

Note. N = 431. *p < 0.05. ** p < 0.01.

To test hypotheses, we employed an SPSS macro program [25] to estimate the mediation effects. Specifically, we used Model 4 in PROCESS, which generates direct and indirect effects in mediation, where total effects, direct effects and indirect effects are estimated by means of OLS regression analyses. Moreover, as several methodologists have recently recommended using a bootstrap approach to obtain confidence intervals (CIs), we tested the mediation hypothesis through a bootstrapping procedure with 10,000 samples. Since this research aims to unfold the different mechanisms in the creative learning environment-creativity association, in the following analyses, we controlled for other mediators testing a specific mediator to further validate the mediating effects.

Table 2 shows the results. Specifically, regarding to testing H1, in Model 1, creative learning environment was positively associated with student creativity ($\beta = 0.79$, $p < 0.001$), supporting H1. Regarding to testing H2, H3 and H4, in Model 2, creative learning environment was positively associated with learning goal orientation ($\beta = 0.45$, $p < 0.001$) after controlling network ties and knowledge sharing. In Model 3, creative learning environment was positively associated with network ties ($\beta = 0.33$, $p < 0.001$) after controlling learning goal orientation and knowledge sharing. In Model 4, creative learning environment was positively associated with knowledge sharing ($\beta = 0.14$, $p < 0.05$) after controlling learning goal orientation and network ties. Moreover, when all the independent variable (i.e., creative learning environment) and three mediators (i.e., learning goal orientation, network ties, and knowledge sharing) were entered in the regression model (i.e., Model 5), all these independent variable (learning goal orientation, $\beta = 0.25$, $p < 0.001$; network ties, $\beta = 0.033$, $p < 0.001$; knowledge sharing, $\beta = 0.14$, $p < 0.001$) and mediators are positively related to student creativity. That is, the relationship between creative learning environment and creativity was partially mediated by three mediators. To further examine the mediating effects, we conducted a bias-corrected bootstrap (10,000 resamples) analysis. The results (in Table 3) showed that the indirect effect of creative learning environment on creativity through learning goal orientation was 0.11 (95 %

CI = 0.064, 0.163), supporting H2; through network ties was 0.11 (95 % CI = 0.056, 0.170), supporting H3; through knowledge sharing was 0.02 (95 % CI = 0.001, 0.049), supporting H4.

Table 2. Results of the mediation regression analyses

Variables	Model 1 Creativity	Model 2 Learning orientation	Model 3 Network ties	Model 4 Knowledge sharing	Model 5 Creativity
Constant	1.34***	0.21	0.72**	0.51*	0.50***
Gender	-0.04	-0.10	-0.09	0.18*	-0.01
Subject	-0.07	0.02	-0.13	0.07	-0.04
Creative learning environment	0.79***	0.45***	0.33***	0.14*	0.21***
Learning goal orientation			0.39***	0.46***	0.25***
Network ties		0.26***		0.18***	0.33***
Knowledge sharing		0.34***	0.20***		0.14***
R ²	0.54	0.69	0.55	0.54	0.55
F	166.44***	188.16***	104.86***	100.68***	104.86***

Note. N = 431. *p < 0.05. ** p < 0.01. *** p < 0.001.

Table 3. Direct and indirect effects of creative learning environment on creativity through mediators

Direct effect				Indirect effect			
Effect	se	t	95 % CI		se	t	95 % CI
0.21***	0.40	5.25	0.133, 0.291	Mediator: Learning goal orientation	0.11***	0.03	0.064, 0.163
				Mediator: Network ties	0.11***	0.03	0.056, 0.170
				Mediator: Knowledge sharing	0.02***	0.01	0.001, 0.049

Note. N = 431. Based on 10,000 bootstrapping samples. * p < 0.05. ** p < 0.01. *** p < 0.001.

Discussion

Theoretical Implications

The main aim of the present study was to investigate how a creative learning environment can foster student creativity in class through multiple intervening mechanisms. There are several implications of this study that will enrich the current literature. First, this study fills the gap regarding the potential influence of a creative learning environment on creativity. Although previous studies have conceptually suggested that a learning environment that promotes creative activities in class boosts students' academic outcomes [2, 6], there is less empirical evidence to establish the benefits for creativity. Thus, this study answers scholars' call to "provide clear evidence of the effectiveness of creative learning environments" [6] (p.89) by theorizing about the positive influences of a creative learning environment on undergraduate students' creativity.

Moreover, this study represents one of the first attempts to simultaneously examine distinct mechanisms from a different perspective to explain how a creative learning environment elicits student creativity. Specifically, drawing on the dynamic componential model, the findings extend the current understanding of learning goal orientation, network ties, and knowledge sharing as distinct mediators. In recent years, scholars have increasingly argued that identifying multiple mechanisms can comprehensively reveal the effectiveness of contextual predictors for creativity [7]. Nevertheless, few studies have either explored the possibilities of various mediators simultaneously or focused on undergraduate students' creativity. This study deepens our understanding of the processes involved in generating student creativity in which a creative learning environment can increase students' learning goal orientation, network ties, and knowledge sharing concurrently to further boost their creativity.

Educational Implications and Limitations

According to the findings, creating a learning environment should consider creative aspects to effectively enhance student creativity in class. Specifically, teachers can encourage students to learn and think creatively (e.g., taking risks, building free and open communication channels, supporting

creative ideas, and allowing more freedom and choice while students complete their assignments). Moreover, as students' learning goal orientation, network ties, and knowledge sharing are key mediators for transferring the benefits of a creative learning environment, teachers should place value on the understanding of concepts and emphasize student effort over course grades [15]. In doing so, teachers can build students' learning goal orientations more in the direction of creative achievement. Regarding the development of students' network ties, they can be provided with training programs to develop their abilities to manage individual social connections and those of others, thus enabling them to study effectively while developing collaboration skills in class. Finally, teachers can consistently highlight the importance of exchanging and sharing new knowledge, which can help students acquire novel information to enhance their learning processes and effectiveness in a creative manner.

There are several limitations in this research. First, the cross-sectional research design cannot entirely rule out the problem of causality (e.g., student creativity may facilitate the process of building a creative learning environment in class). Thus, future research can employ more sophisticated testing to determine the direction of causality. Second, as the findings indicated the partial mediation effects, studies in the future can include other mediators (e.g., collective learning behaviors) that may comprehensively explain the effectiveness of creative learning environment on student creativity. Finally, regarding to the sample of undergraduate students in China in the present study, further research with other samples (e.g., postgraduate students) can extend the generalizability of findings.

Summary

As providing education on creativity is a major challenge and a high priority for future course design for students, determining how to boost student creativity has been the subject of scholars' attention. This study proposes and examines whether and how multiple mechanisms can mediate in the effect of a creative learning environment on undergraduate creativity. The research findings indicate that a creative learning environment can significantly enhance students' learning goal orientation, network ties, and knowledge sharing, which in turn facilitate their creativity. The direct implication is that researchers and educators should be more concerned about building creative learning environments and helping students in their development of a learning goal orientation, network ties, and knowledge sharing.

References

- [1] R.A. Beghetto, J.C. Kaufman, Classroom contexts for creativity, *High Abil. Stud.* 25 (2014) 53-69.
- [2] C. Richardson, P. Mishra, Learning environments that support student creativity: Developing the SCALE, *Think. Skills Creat.* 27 (2018) 45-54.
- [3] Y.-c. Yeh, Y.-l. Yeh, Y.-H. Chen, From knowledge sharing to knowledge creation: A blended knowledge-management model for improving university students' creativity, *Think. Skills Creat.* 7 (2012) 245-257.
- [4] S. Chan, M. Yuen, Personal and environmental factors affecting teachers' creativity-fostering practices in Hong Kong, *Think. Skills Creat.* 12 (2014) 69-77.
- [5] C.Y. Tsai, J.S. Horng, C.H. Liu, D.C. Hu, Y.C. Chung, Awakening student creativity: Empirical evidence in a learning environment context, *J. Hosp. Leis. Sport Tour. Educ.* 17 (2015) 28-38.
- [6] D. Davies, D. Jindal-Snape, C. Collier, R. Digby, P. Hay, A. Howe, Creative learning environments in education—A systematic literature review, *Think. Skills Creat.* 8 (2013) 80-91.
- [7] T.M. Amabile, M.G. Pratt, The dynamic componential model of creativity and innovation in organizations: Making progress, making meaning, *Res. Organ. Beh.* 36 (2016) 157-183.

- [8] W.S. Chow, L.S. Chan, Social network, social trust and shared goals in organizational knowledge sharing, *Inf. Manage.* 45(7) (2008) 458-465.
- [9] V.M. Cheng, Infusing creativity into Eastern classrooms: Evaluations from student perspectives, *Think. Skills Creat.* 6 (2011) 67-87.
- [10] A. Kozbelt, R.A. Beghetto, M.A. Runco, Theories of creativity, *The Cambridge handbook of creativity 2* (2010) 20-47.
- [11] K. Chappell, A. Craft, Creative learning conversations: producing living dialogic spaces, *Educ. Res.* 53 (2011) 363-385.
- [12] B. Mishra, The organizational learning inventory: an assessment guide for understanding your institution's learning capabilities, *Learn. Organ.* 25(6) (2018) 455-456.
- [13] D. VandeWalle, W.L. Cron, J.W. Slocum Jr, The role of goal orientation following performance feedback, *J. Appl. Psychol.* 86 (2001) 629-640.
- [14] L.-E. Malmberg, Student teachers' achievement goal orientations during teacher studies: Antecedents, correlates and outcomes, *Learn Instr.* 18(5) (2008) 438-452.
- [15] M.S. Lerang, S.K. Ertesvåg, T. Havik, Perceived classroom interaction, goal orientation and their association with social and academic learning outcomes, *Scand. J. Educ. Res.* 63 (2019) 913-934.
- [16] Y. Gong, J.C. Huang, J.L. Farh, Employee learning orientation, transformational leadership, and employee creativity: The mediating role of employee creative self-efficacy, *Acad. Manage. J.* 52 (2009) 765-778.
- [17] S.J. Shin, T.Y. Kim, J.Y. Lee, L. Bian, Cognitive team diversity and individual team member creativity: A cross-level interaction, *Acad. Manage. J.* 55 (2012) 197-212.
- [18] M.I. Eid, I.M. Al-Jabri, Social networking, knowledge sharing, and student learning: The case of university students, *Comput. Educ.* 99 (2016) 14-27.
- [19] S. Dawson, A study of the relationship between student social networks and sense of community, *Int. J. Educ. Technol. Soc.* 11(3) (2008) 224-238.
- [20] S. Liu, M. Zhu, D.J. Yu, A. Rasin, S.D. Young, Using real-time social media technologies to monitor levels of perceived stress and emotional state in college students: a web-based questionnaire study, *JMIR Ment. Health.* 4 (2017) e2.
- [21] W.R. Bukowitz, R.L. Williams, *The knowledge management fieldbook*, Financial Times/Prentice Hall 2000.
- [22] R.W. Brislin, *The Wording and Translation of Research Instruments*; Sage Publications, Inc.: Thousand Oaks, CA, USA, 1986.
- [23] E.M. Skaalvik, Self-enhancing and self-defeating ego orientation: Relations with task and avoidance orientation, achievement, self-perceptions, and anxiety, *J. Educ. Psychol.* 89 (1997) 71-81.
- [24] S.M. Farmer, P. Tierney, K. Kung-Mcintyre, Employee creativity in Taiwan: An application of role identity theory, *Acad. Manage. J.* 46 (2003) 618-630.
- [25] A.F. Hayes, *PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]*, 2012.