

The Impact of Imagination and Affective Creativity on University Students' Creative Thinking: A Verification through Structural Equation Model

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Both imagination and affective creativity were identified to instigate individuals' creative thinking separately. However, the interaction effect of these factors may overwhelm their single-factor effects while simultaneously occurring. This study purports to validate the moderating effects of affective creativity on the influential power of imagination to creative thinking. Validated instruments were employed to examine the performance of 402 students in the National Yunlin University of Science and Technology (NYUST), Taiwan. Taking a moderation model analysis, this study revealed that students' affective creativity and imagination individually created a single-factor effect on their creative thinking; their interaction effect occurred and dominated the effects. The effective creativity moderated the impact of imagination on creative thinking: that is, students with average and higher levels of effective creativity would possess better creative thinking according to their imagination. Conversely, for the student with a low level of affective creativity, their imagination could not inspire creative thinking. These findings further clarified the factor effects on and influential approaches to youngsters' creative thinking development.

Key words: *Affective creativity, creative thinking, imagination, moderation effects*

Introduction

Creative thinking is a coral capability of producing numerous original ideas that facilitate individuals to solve their problems and enrich their lives (Amabile, 2012; Barrow, 2010; Chang & Hsu, 2015). Serrat (2017) has been proven more than ever as a crucial skill in this dynamic and challenging era. Torrance's longitudinal study of 50 years on creative thinking revealed that individuals' creative thinking was moderately correlated with their achievement (Runco et al., 2010). This capability also assists people to reach higher career achievement, particularly in the current world, extremely demanding creative industries (Chen et al., 2015; Cropley & Cropley, 2013). It is also an essential intangible asset for an organisation (Serrate, 2017), business (Khedhaouria et al., 2014), and even a nation (Comunian & Gilmore, 2016). Therefore, it is crucial to investigate the coral factors affecting youngsters' creative thinking before instructors develop efficient instructions for their creative learning (Prera, 2019).

Previous studies revealed that several factors significantly correlated with individuals' creative thinking performance, such as self-efficacy (Khedhaouria et al., 2014), affective creativity (Wu et al., 2017), imagination (Lin et al., 2014) and academic achievement (Silvia & Beaty, 2012). Some of these factors were separately identified to create effects on creative thinking. Imagination was declared to foster the creativity of an individual (Tsai, 2012). However, both imagination and creative thinking involve the processes and production of novelty or something innovative through the combination and recombination of individuals' prior experience (Subadah, 2020). It is sceptical that if imagination could result in creative thinking due to the complex interrelation between them. Crucial issues worthy special nothing additionally emerge the interaction effects occur while several factors simultaneously existing? Also, do the interaction effects overwhelm the single factor effect?

The previous study by Hoffmann and Russ (2012) revealed that children who exhibit more imagination tend to be better creative storytellers. Imagination has a medium effect size on relationships to fluency, flexibility, and creativity in storytelling (Hoffmann & Russ, 2012). Furthermore, Hsu et al. (2014) divided imagination into three constructs conceiving imagination, initiating imagination, and transforming imagination. Conceiving imagination significantly positively affect individuals' creativity especially on the sub variable originality and usefulness, and initiating imagination significantly positively affect individuals' creativity especially on the sub variable originality and usefulness (Hsu et al., 2014). However, transforming imagination negatively significantly affect individual's creativity, especially on the sub variable originality and insignificant influence on usefulness (Hsu et al., 2014). Based on the previous studies (Hoffmann & Russ, 2012; Hsu et al., 2014; Naderi et al., 2010) mentioned earlier, it seems that imagination affecting individuals' creativity in various effect power and directions, suggesting there might be another factor influences the relationship between the two variables.

This study consequently purports to investigate the interaction effects and the influential paths of imagination and affective creativity simultaneously existing on creative thinking. The moderating effect of affective creativity on the influential process is proposed to be examined.

Creative Thinking Definition

Creative thinking has been recognised as individual's ability to create a new idea, object, product or a process. It is studied in numerous fields but furthestmost in the areas of education and psychology (Fareedha & Nawastheen, 2020). Furthermore, as an essential skill in this challenging era, creative thinking has been defined as (1) individuals ability to purposively design and produce an important product that benefits people; (2) individuals ability to produce new, original, valuable, and novel ideas or outcomes related to their domain major or expertise (Amabile, 2012); (3) individuals unique cognitive ability to generate new ideas or products including reshaping or rearranging of what is already known by themselves; (4) People ability to develop new ideas, strategies, and ways of executing an assignment, producing greater or higher results; and (5) Individual and team ability to produce novel products/approaches to solve a problem and benefit people, individually and society (Barrow, 2010). Hence, creative thinking can be concluded as individual's capability to produce novel ideas to solve the problem and give benefits to themselves and others (Poongkodi, 2017).

Major Factors of Creative Thinking

Most researchers indicate fluency, elaboration, flexibility, and originality as the key determinants of creative thinking (Prera, 2019). Fluency refers to individual ability to rapidly-produce a large number of ideas, consequences or possibilities related to the problem encountered. Flexibility defines as the ability to produce a large variety of alternative ideas, and adapting to changing conditions, thinking independently, and creating different perspectives on the situation faced. Originality describes as the ability to produce ideas that are unusual and completely different from the common thoughts (Taylor, 2008). Elaboration is the ability to develop and elaborate on the ideas to make it real and understandable.

Factors Influence Individual Creative Thinking

Amabile (1996) suggested that there are essential elements that develop individual creativity, including task motivation, domain-relevant skills, and creativity relevant processes. Furthermore, Csiksentimihalyi (1999) proposed creativity as the systemic process of interactions among the individual, domains, and professional field. The two scholars proposed that individual creativity development affected by the internal and external environment (Chang & Hsu, 2015). Internal factors such as imagination (Tsai, 2012), self-

efficacy, personality, and intelligence. External factors including culture (Csiksentimihalyi, 1999), stimulation, information literacy (Chang & Hsu, 2015) and environment.

Imagination

Lin et al. (2014) define imagination as individual's ability to think of something unreal and initiate, conceive, and change their ideas into intention plans and actions. Imagination allows the individual to go beyond real experiences and build some alternative possibilities into a new meaning (Liang et al., 2013). Tsai (2012) and Vygotski (2004) stated that imagination is built-in individual's mind using materials supplied by reality, contexts, individual's feelings and experiences. Hence, it can be concluded that imagination is individual ability to transfer their previous feeling retrospectively, thought, and experiences to conceptually visualise something that might be does not exist yet in the form of new products, process, or events.

Moreover, previous studies indicated that imagination is able to stimulate individual's creative thinking. Imaginative people are able to create new possibilities and offer new perspectives on something familiar. However, it does not necessarily mean that imaginative people must be creative ones because multifaceted factors are existing between imagination and creative thinking (Kavetha, 2018). For instance, conceiving imagination or individual capability of mentally forming an image in minds, and initiating imagination or individual capability of initiating pioneering concepts, significantly affect individuals' creativity especially on the constructs of originality and usefulness (Chang & Hsu, 2015). However, transforming imagination or individual capability of creating mental images based on the previous experiences, has a negative effect on originality and insignificant influence on utility (Chang & Hsu, 2015). It is worth thinking deeply about that some factors might moderate the effect of imagination on creative thinking.

Affective Creativity Definition

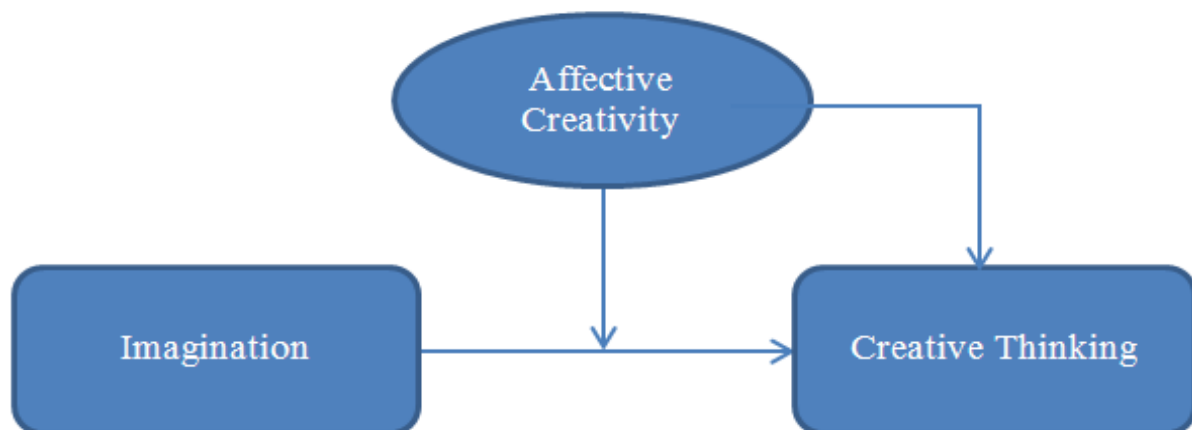
Affective creativity refers to creative attitudes, and/or emotional intelligence facilitating people's creativity (Byrge & Hansen, 2009; Mayer et al., 2004). Abadzi et al. (2009) declaimed that the cognitive process of an individual could not occur without effective creativity to fortify action intention. It means that creative thinking is an interaction between cognitive ability and affective intention during the creative processes. Hence, effective creativity positively influences people creative thinking in both direct and indirect approaches (Lewis et al., 2011).

The relationship among Creative Thinking, Imagination, and Affective Creativity

Creative thinking, an individual ability to produce ideas, with spontaneity, originality, and autonomy, to solve the problem, is very crucial for an individual, organisation, and even for a nation. Imagination and affective creativity could inspire and enhance the development of individual's creative thinking. People utilise their imagination to incite their previous experiences and curiosity about current issues retrospectively, arise an innovative picture or word, and construct alternative solutions to solve problems. Creative thinking is also influenced by individuals' affective creativity, an emotional factor, through both direct and indirect approaches (Abadzi et al., 2009; Mayer et al., 2004).

Individuals who are imaginative and curious adventurers have higher creative thinking. Therefore, the cultivation of imagination and affective creativity functioning to improve students' creative thinking is highly needed in educational settings. This study consequently suggested that there are positive influential relationships among imagination, affective creativity, and creative thinking, as shown in Figure 1.

Figure 1. Conceptual framework of this study



Methods

This study was an ex post facto study that purposed to identify the existent phenomena and researchers did not do any intervention on the samples.

Population and Samples

University students were the significant targeted population in this study. Considering the convenience and controllability of data collection, this study selected 430 university students in central Taiwan as a research sample with their permissions. Twenty-eight respondents were excluded from the examination due to their incomplete data. Finally, the data from 402

students were statistically analysed, including 163 (41%) male and 239 (59%) female students, as shown in Table 1. They were from colleges of design (123), engineering (85), management (131), and graduate school (63).

Table 1: Background of samples (N=402)

	N	%
Gender		
Male	163	41
Female	239	59
Department		
Design	123	31
Engineering	85	21
Management	131	33
Graduate school	63	16

Instruments

The research data were collected through the following instruments, which were all validated in previous researches.

Creative Thinking Scale

The creative thinking scale in Chinese edition was developed by Xu and Tien (2002) that consisted of three constructs, including originality, efficiency, and flexibility. Students were asked to report how they initiated their ideas and how they adjusted to others' opinions. The scale used in this study consisted of two major constructs: originality (9 items, for example, I can quickly come up with many new ideas) and flexibility (8 items, for instance, I work accordingly, not contrary to the conventional) as the subscales. The creative thinking scale possessed acceptable reliability of overall creative thinking scale (0.743) and its constructs: originality (0.838) and flexibility (0.776).

The imagination of Future Scale

The imagination of the future in this study was measured using the validated instrument in Chinese edition revised by Wu, Chang, Chiu, and Chen (2013). The original of imagination for future scale comprised of four constructs: (1) past review and future predict, (2) beyond reality, (3) situation construction, and (4) emotion and value. The Cronbach's alpha internal consistency coefficient was high (0.908), and the internal consistency for the four sub-scales were 0.906, 0.855, 0.841, and 0.805, respectively. This study selected two significant imagination constructs highly related to research purpose: past review and future predict (5

items; for instance, I have often thought about the whole concept of coping with an uncertain future), and Situation Construction (6 items, for example, How do I often predict the future of the world's population).

Affective Creativity Scale

The students' affective creativity instrument in Chinese edition developed by Xia (2008) was adopted and utilised in this study. This effective creativity scale used in this study comprised of three main affective domains pertaining to (1) curiosity (7 items, for example, I like rummaging through, seeing things in it); (2) imagination (7 items, for instance, I like to imagine something that I want to know or want to do); and (3) adventure (4 items, for example, I understand that there is a part-time job to gain experience for the future because the future does not always work out). The effective creativity instrument had high reliability (0.868) for the overall instrument, and acceptable for its three constructs curiosity (0.723), imagination (0.800), and adventure (0.553).

Data Collection Procedures

This instrument, including three major subscales of creative thinking, imagination, and affective creativity, was delivered to the students in their classes under the cooperation of instructors. It took approximately 15-20 minutes to complete all the items.

Data Analyses

The returned instruments were checked on its completeness for further analysis using the SPSS 22 statistical software package to investigate its validities, reliabilities, and relationships. This study also undertook a linear regression analysis to investigate the effects of imagination and affective creativity on students' creative thinking. Furthermore, a PROCESS-macro software (Hayes, 2013) integrated into SPSS was employed to analyse the moderation effect of affective creativity on the influential effect between students' imagination and creative thinking. Moreover, a PROCESS-macro, taking 1 standard deviation above and below the mean value, was employed to analyse the relationship between students' imagination and creative thinking at different levels of effective creativity.

Results and Discussion

Results

Validities and Reliabilities of the Instruments

Pearson Correlation and Cronbach's Alpha coefficient were examined to verify the validities and reliabilities of the instruments. The statistical results revealed that each item possessed acceptable validity (.303** ~ .743**) (Table 2) which indicated that this instrument was competent enough to measure the respondents' characteristics on all variables (Hair et al., 2009). Moreover, this instrument was also approved with good reliabilities in the constructs of affective creativity, creative thinking, and imagination (.829, .790, and .846 respectively) (Hair et al., 2009).

Table 2: Reliabilities and validities of this instrument

Variables and Constructs (N)	Validity	Reliability (α)
Affective Creativity (18)	.420**~.569**	.829
Curiosity (7)	.420**~.569**	.719
Imagination (7)	.462**~.536**	.695
Adventure (4)	.458**~.552**	.626
Creative Thinking (17)	.347**~.575**	.790
Originality (9)	.437**~.575**	.767
Flexibility (8)	.347**~.548**	.691
Imagination (11)	.303**~.743**	.846
Future Prediction (5)	.303**~.743**	.803
Plot Construction (6)	.499**~.729**	.842

Students' Performance of Creative Thinking, Imagination, and Affective Creativity

These university students generally recognised their affective creativity (M=3.58), imagination (M=3.40), and creative thinking (M=3.41) as above-average levels (Table 3). Relatively, affective creativity (M=3.58) received the highest recognition and confidence, while their imagination (M=3.40) the lowest.

The t-test result exposed no significant difference between male students' performance and female peers' one in creative thinking, imagination, and affective creativity (0.207, 0.827, and 0.305, respectively, as shown in Table 4. Similar to previous studies (Byrge & Tang, 2015; Saeki et al., 2001), this finding reclaimed modern education overwhelmed the gender barrier and cultivated youngsters with equivalent talents in affective creativity, imagination, and creative thinking (Matud et al., 2007).

Table 3: Students' performance of creative thinking, imagination, and affective creativity (N=402)

	Mean	SD	Low $X < M-1SD$	Average $M-1SD \leq x < M + 1SD$	High $X \geq M+1SD$
			N (%)	N (%)	N (%)
Creative Thinking	3.41	0.59	60 (14.9)	251 (62.4)	91 (22.6)
Imagination	3.40	0.64	81 (20.1)	158 (64.2)	63 (15.7)
Affective Creativity	3.58	0.49	141 (35.1)	198 (49.3)	63 (15.7)

This study compared the performance of students in Design majors (N=123; 31%), Engineering majors (N=85; 21%), Management majors (N=131; 33%), and Graduate school (N=63; 16%). The results from an analysis of variance results (Table 5) exposed that there was no significant difference among these four-group students' performance in imagination (F-value = 1.912) and affective creativity (F-value = 1.193). Conversely, there is a significant difference in the students' creative thinking (F = 3.137**). Creative thinking of students from design (M=3.54) was significantly higher (F = 3.137**) than Engineering students (M=3.40), Graduate students (M=3.40), and Management students (M=3.31).

Table 4: Male and female students' performance of creative thinking, imagination, and affective creativity

	Male	Female	t	Sign
Creative Thinking	3.37	3.44	-1.27	0.207
Imagination	3.39	3.41	-0.22	0.827
Affective Creativity	3.61	3.56	1.03	0.305

Note: * $p < 0.05$

This indicated that students of design departments have higher creativity than students from other departments. The Design department at NYUST consists of several major fields such as creative design, architecture design, and digital media design. It seemed to reflect that these students frequently explored creative design curricula and instructional approaches which required and fostered their arty skills and creative thinking, even imagination and effective creativity. This finding was coherent with those who revealed that students of the Art Department performed higher creativity than students from Engineering Schools due to their learning experiences. In addition, students of architecture design were also found to outperform obviously than their Engineering peers on their creativity performance (Casakin & Kreitler, 2010).

Table 5: Engineering, Design, Management, and Graduate students' performance in creative thinking, imagination, and affective creativity

	1	2	3	4	F
Creative Thinking	3.40	3.54	3.31	3.40	3.137**
Imagination	3.37	3.50	3.31	3.44	1.912
Affective Creativity	3.60	3.63	3.52	3.60	1.193

Note: 1. Engineering; 2. Design; 3. Management; 4. Graduate school; ** is significant at 0.05 level

Correlations among Affective Creativity, Creative Thinking, and Imagination

The Pearson coefficient analyses were undertaken, and the results indicated that students' affective creativity, imagination, and creative thinking were all positively and significantly related with each other (.604**, .531**, and .498**), as shown in Table 6. These strong relationships designated that these three constructs were intensively coexistent with and mutually dependent on one another (Field, 2013).

Table 6: Correlation among the affective creativity, creative thinking, and imagination

	1	2	3
1. Affective Creativity	1		
2. Creative Thinking	.604**	1	
3. Imagination	.531**	.498**	1

** . Correlation is significant at the 0.01 level.

The Single-factor Effects of Imagination and Affective Creativity on Creative Thinking

Linear regression was conducted to analyse the effects of imagination and affective creativity on students' creative thinking. According to the analysis results (Table 7), imagination was positively significant as a predictor of individuals' creative thinking ($\beta = 0.498$, 95%, $t = 11.485$, $p = 0.000$). That is, one unit of students' imagination would create 0.498 of their creative thinking increase. Furthermore, the effect-size value (R^2) was 0.248 represented that imagination might be able to explain 24% of individuals' creative thinking improvement.

Correspondingly, affective creativity was approved positively significant as a predictor of individuals' creative thinking ($\beta = 0.610$, 95%, $t = 15.415$, $p = 0.000$) (Table 7). Both imagination and affective creativity would individually create a significant effect on creative thinking. These findings were coherent with the previous studies, which stated that imagination and affective creativity could influence people's creative thinking (Wu et al., 2017). However, curiosity emerges that does the interaction effect occur while these three

factors exist simultaneously? Could effective creativity moderate the influential relationship between students' imagination and their creative thinking?

Table 7: The effects of imagination and affective creativity to creative thinking

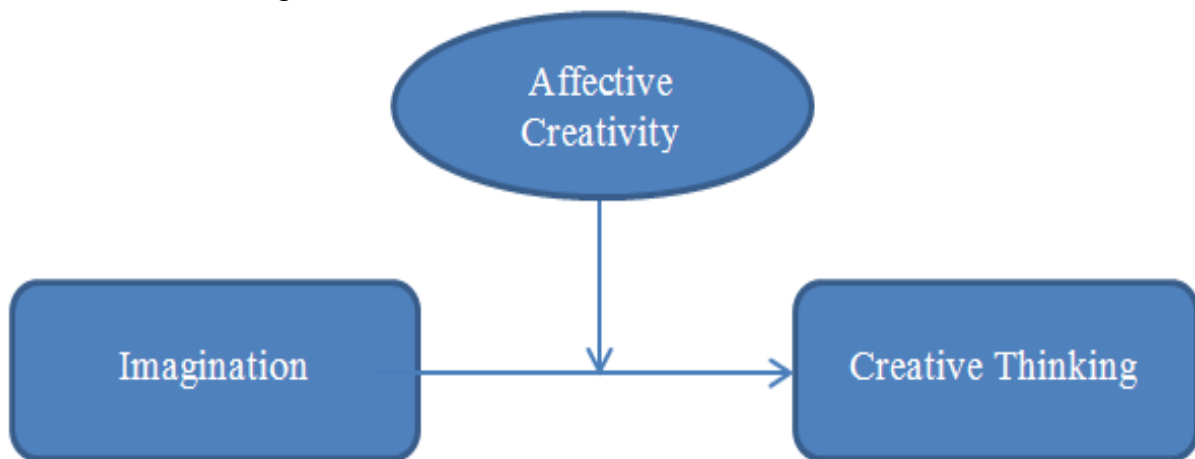
Predictor	R ²	B	SE B	β	t	p
Imagination*	0.248	1.866	0.137	0.498	11.485	0.000
Affective creativity*	0.373	0.783	0.172	0.610	15.415	0.000

*Dependent variable: creative thinking

The Interaction Effect –Validating Moderation Effects of Affective Creativity on Imagination and Creative Thinking

A moderation effect happens while the size and/or strength of the effect of a predictor (X) on a dependent variable (Y) depends on a moderator (M) (Hayes, 2013). For instance, there is a minor effect of exercise on cholesterol levels if the individual consumes low drug doses. Still, there is a considerable impact of exercise on cholesterol levels while the individual consumes relatively high drug doses (Tsang, 2015). This study proposed affective creativity (M) as a moderator and examined whether it would affect the influential relationship between imagination (X) and creative thinking (Y) (Figure 2). The regression analysis was undertaken the procedure PROCESS by Hayes for SPSS 22 (Hayes, 2013).

Figure 2. Affective Creativity Moderates the Influential Relationship between Imagination and Creative Thinking



The data analysis result in Table 8 revealed that there was a significant moderation effects ($\beta_3 = 0.281$, 95% CI [0.17, 0.39], $t = 4.91$, $p < 0.050$) of affective creativity on the influential relationship between imagination and creative thinking (Field, 2013). The variance analysis result was significant ($F = 24.077$, $p < 0.050$) which indicated the model was well explained

which suggested that the relevance and the strength of the relationship between imagination and creative thinking varied depending upon the level of individuals' affective creativity.

Table 8: Linear model of predictors of students' creative thinking

	β (effect)	Se B	T	p	CI [95%]
Constant	(β_1) 3.997	0.726	5.508	0.000	[2.57, 5.42]
Affective creativity (M)	(β_2) -0.392	0.210	-1.871	0.062	[-0.80, 0.20]
Imagination (X)	(β_3) -0.780	0.210	-3.707	0.000	[-1.19, -0.37]
Interaction between Imagination and Affective Creativity	(β_4) 0.281	0.057	4.907	0.000	[0.17, 0.39]
Model		$R^2=0.027$	F = 24.077		$P < 0.000$

Outcome: Students' Creative Thinking (Y)

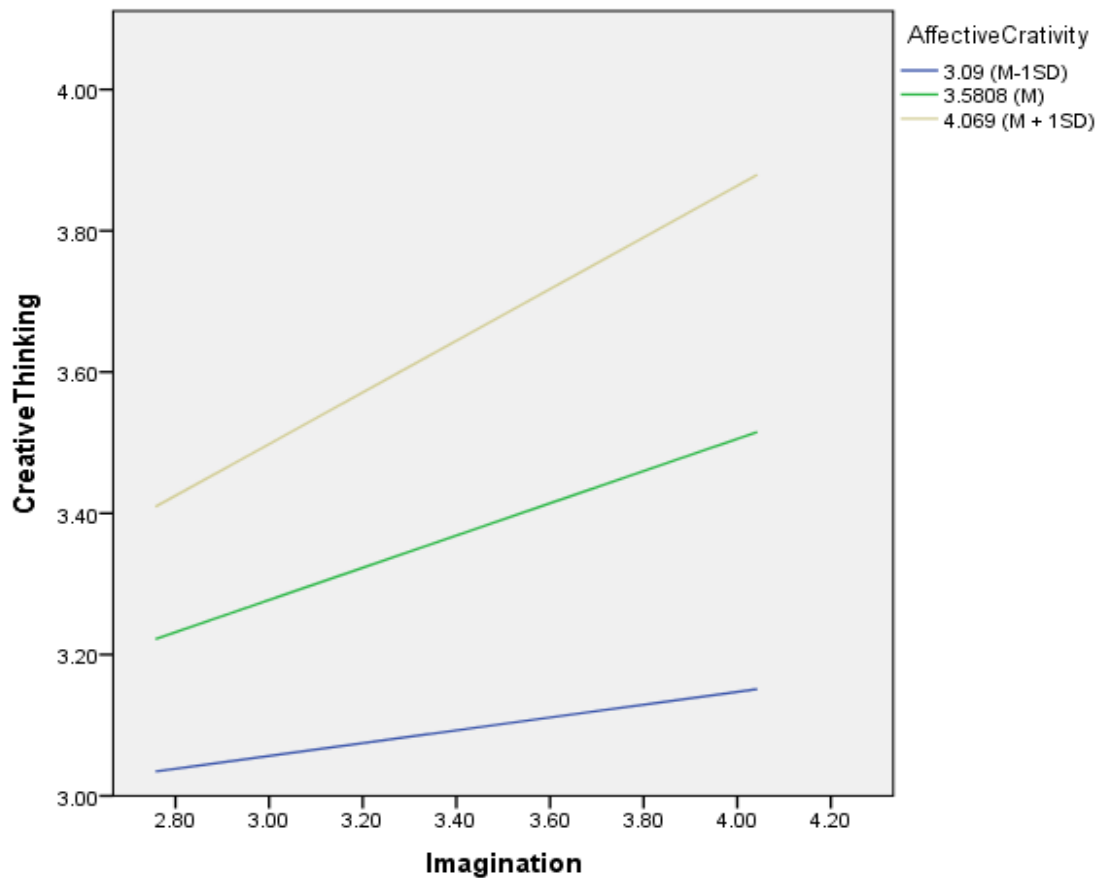
Furthermore, this study illustrated different effects resulted from three levels of students' affective creativity, as shown in Table 9 and Figure 3, on the influential relationship between students' imagination and their creative thinking. First, for the students with low (M=3.09 or M – 1SD) students' affective creativity, their imagination could not inspire significant effect relationship with creative thinking ($\beta = 0.091$, 95% CI [-0.01, 0.19], $t = 1.727$, $p = 0.085$), as shown in Table 9 (Field, 2013).

Table 9: Moderation effect of affective creativity between students' imagination and creative thinking

	Mean	β (effect)	Se B	t	p	CI [95%]
Low (M-1SD)	3.09	0.091	0.053	1.727	0.085	[-0.01, 0.19]
Average (M)	3.58	0.228	0.044	5.144	0.000	[0.14, 0.32]
High (M+1SD)	4.07	0.366	0.052	6.982	0.000	[0.26, 0.47]

Second, when students' affective creativity was at average level (M= 3.58), their imagination could instigate significantly positive influence on creative thinking ($\beta = 0.228$, 95% CI [0.14, 0.32], $t = 5.144$, $p = 0.000$) (Field, 2013). Third, when students' affective creativity became a high level ([4.07] or M + 1SD), their imagination could instigate significant positive effects on creative thinking ($\beta = 0.366$, 95% CI [0.26, 0.47], $t = 6.982$, $p = 0.000$) (Field, 2013). This finding indicated that both the students with average and higher levels of affective creativity, their imagination could motivate creative thinking accordingly. Affective creativity plays a crucial role as a moderating factor, determinate the influential effects of imagination on creative thinking.

Figure 3. Interaction between imagination and affective creativity predicts students' creative thinking



The analysis results also revealed that the high students' affective creativity inspired higher effect ($\beta = 0.366$) than average ($\beta = 0.228$) and low ($\beta = 0.091$) on the influential effects of imagination to creative thinking. Hence, it can be concluded that the interaction between imagination (IM) and affective creativity (AC) would facilitate students to achieve higher creative thinking (CT) only when they have average or greater levels of affective creativity.

Discussion

University students are expected to develop their creative thinking for their future in this dynamics world (Beghetto & Kaufman, 2013; Beghetto et al., 2014). It is crucial to identify factors and approaches influencing university students' creative thinking (Drapeu, 2014). This study was constructed based on the componential model theory (Amabile, 1996) and three-variable system model of creativity theory (Csikszentmihalyi, 1996) and verified that individual's creative thinking arises from various sources and their interaction effects rather than any single-factor effect. It was approved individuals' creative thinking is inspired

through the interaction of imagination and affective creativity; during the process the affective creativity is moderating the effect of imagination on creative thinking.

Imagination and Affective Creativity Positively Influence Creative Thinking

This study supported previous studies (Taylor, 2017; Tsai, 2012; Vygotsky, 2004; White, 2017) and confirmed that imagination created a significantly positive effect on individuals' creative thinking. In addition, effective creativity was approved to influence youngsters' creative thinking as previous studies (Abadzi et al., 2009; Lewis et al., 2011). These two factors can individually influence creative thinking.

Affective Creativity Moderates the Influential Effect of Imagination on Creative Thinking

While these factors simultaneously exist, their interaction effect occurs and overwhelms individual effects. This study revealed that affective creativity moderates the relationship between imagination and creative thinking. It supports previous studies which stated that individuals' creative thinking might be atypically enhanced through an interaction effect and confluence approach of several variables (Cropley & Cropley, 2013; Wu et al., 2017).

Imagination consists of individuals' association with past experiences, future prediction, and situation reorganisation. Affective creativity includes emotional curiosity, fantasy, and adventure. They both are highly related to people's various experiences (Vygotsky, 2004) even multicultural exploration (Leung & Chiu, 2010). Yagolkovskiy (2016) further declaimed students' creative thinking could be effectively instigated by innovative and rare ideas of team members with heterogeneous backgrounds to solve a well-defined creative task (Tang & Byrge, 2016). It seems that new experiences, from innovative knowledge and partners, assist students in being truly curious, initiate new unconventional concepts, and finally produce the new creative idea.

Special concern should go to the finding that affective creativity plays a moderation factor role in the influential process while imagination inspiring creative thinking. That cautiously prompts a crucial message that creative thinking needs emotional affective creativity to facilitate creative thinking, while cognitive imagination initiating the original intention to undertake the creativity processes effectively. Only individuals with adequate, effective creativity can create innovative thinking, even imaginatively.

Conclusions

Finally, this study drew the following synthetic conclusions:

- 1) The current university students generally possess satisfactory performance in imagination, affective creativity, and creative thinking. That seems to present these youngsters receive appropriate inspiration and innovation in higher education.
- 2) Female students equivalently performed on their creative thinking, imagination, and effective creativity. That implied that modern education facilitates youngsters, both male and female, possess the equivalent talents without gender barrier or conventional limitation.
- 3) Imagination and affective creativity were separately approved as a crucial factor influencing creative thinking; however, they create an interaction effect simultaneously overwhelming the single-factor effects while individuals are developing creative thinking.
- 4) Affective creativity, playing as a crucial role, moderated the influential effect of imagination on creative thinking. Affective creativity and imagination interactively influence students' creative thinking, especially when it has average or higher levels of imagination and effective creativity. Hence, students' creative thinking might be developed through improving their level of imagination when they possess adequate emotional affective creativity.

Based on the research findings, teachers and other education stakeholders are suggested to strengthen students' imagination and affective creativity through providing various experiences to students, enhancing students' professional skills related to current and future demands, and internationalising their academic programs.



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