

The Role of Cognitive and Affective Behavior in Predicting the Creative Thinking of University Students

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Creativity has become a critical skill in the face of future competition and needs to be included in the learning process in educational institutions to prepare highly competitive human beings. Therefore, the ability to predict factors that affect creativity becomes very important in developing the learning process. This study aims to explore the predictors of creative thinking ability that includes affective creativity, future imagination, and positive psychological capital simultaneously and interactively. Data were collected through questionnaires from 278 students of the School of Humanities and Applied Science from one of National University located in Central Taiwan. Data analysis using structural equation modeling analysis. The results show that collaborations among the affective creativity, imagination, and psychological capital significantly influence students' creative thinking. That confirms that students' creative thinking can be nurtured through a combination of several personality factors.

Keywords: affective creativity; creative thinking; imagination; psychological capital.



INTRODUCTION

Shifting demands will continue to occur in the context of global transformation, and one of the skills needed to deal with the dynamics of future challenges is creativity. In today's economy, creativity has become a significant competitive advantage necessary for human survival and well-being in the 21st century (Robinson, 2011) and the development of organizational innovation (Eisele, 2017). The National Advisory Committee for Creative and Cultural Education (NACCCE, 1999) states that the development of youth creativity not only helps develop the capacity for the authenticity of ideas and actions but also prepares them for a successful life in the 21st century. That is because creating new ideas, as well as analyzing and applying them, is the primary process involved in innovation. Therefore, creativity needs to be included in education as part of the educational curriculum in educational institutions (M. Wu, Siswanto, Suyanto, Sampurno, & Tan, 2018). Also, the current education system should prepare as many individuals as possible who have "expert thinking" with learning that leads to the formation of individual creativity to become a successful human being in society.

Thus, the ability to predict factors that affect creativity becomes very important in the learning process. Factor that is considered significant is affective creativity (Lewis, Dontcheva, & Gerber, 2011), because of a creative thinking process cannot be separated from affective creativity. Another factor that is considered essential for encouraging the cultivation of creative thinking is imagination (Tsai, 2012). Besides, positive individual psychology can encourage the creativity of one's thinking (Sweetman, Luthans, Avey, & Luthans, 2010).

Building on this vast database, there can be an almost unanimous consensus on education that creativity can be taught (Kaufman & Beghetto, 2009). Explicitly, forming creativity requires three essential dimensions of affective, cognitive, and psychological. These three dimensions are spelled out in crucial factors to build the creative thinking that is affective creativity (affective), imagination (cognitive), and positive psychological capital (psychology). We believe that building creative thinking can start by creating a comprehensive model of creative thinking processes that involve all three dimensions that include affective creativity, imagination, and positive psychological capital. Hence, it is expected to have a comprehensive analysis of these three factors can prove that building creative thinking need to pay attention to these three dimensions simultaneously.

LITERATURE REVIEW

2.1. Creative Thinking

Many definitions have been proposed by researchers over the last century, almost all of which include two aspects of novelty and usefulness that are seen as the core concepts of creativity (Runco & Jaeger, 2012). Meanwhile, in creativity investment theory defines creativity as a two-stage process of investing in low-cost ideas and then selling the idea at a high cost (Rojas & Tyler, 2018). Furthermore, creativity can be defined in various ways, involving cognitive processes,

personality characteristics, and environmental variables (Sternberg, 2010). Creativity is meaningful in the production of new ideas and is useful for complicated, new, and unclear problems (Runco & Jaeger, 2012).

Measurement of performance tasks involves the attribute of idea generation, combination capability, or restructuring capabilities (Antonietti & Iannello, 2008). Also, creativity measured by the Torrance test, assessing cognitive characteristics with fluency, flexibility, originality, and elaboration, as suggested by Guilford, as well as other qualitative aspects derived from a 30-year longitudinal study (Torrance, 1981). Meanwhile, Xu & Tien (2002) has measured the scale of creative thinking ability in the Chinese language edition consisting of three constructions including originality, efficiency, and flexibility.

2.2. Affective Creativity

According to Sundem (2014), affective creativity is an individual's trait which closely related to creativity such as curiosity, hostility, imaginative, impulsive, autonomy, and willing to take risks. Meanwhile, Byrge & Hansen (2009) say that affective creativity is a creative attitude or body movement in certain situations. According to Muñoz-Blanco & Vargas (2017), creative behaviors created through the environment play a role in creating creative products. Creative behavior or creative attitude is an interaction between two behaviors that is the behavior of people involved in creative behavior and the behavior of individuals who value creative products (Muñoz-Blanco & Vargas, 2017).

Besides, creative people usually find unusual ways to solve problems, be willing to take risks, be able to oppose the dominant ideas of the crowd and be motivated to overcome obstacles that others will not seek to overcome (Sternberg & Lubart, 1996). There is a consensus that personality traits and cognitive characteristics are predictors of creative engagement and creative production in the future (Kaufman et al., 2016). Also, Lewis et al. (2011) suggest that affective creativity positively influences creative thinking.

2.3. Future Imagination

Imagination is the basis for cultivating and developing individual's creative thinking and innovation (Liang, Chang, Chang, & Lin, 2012). Imagination refers to the ability to think of what is unreal or even absurd, and seems to give people powers to build various possibilities beyond reality (Liang, Hsu, Chang, & Lin, 2012). Reproductive imagination is a reorganization of past experiences and develops in our memories, and creative people are people who consciously reorganize past experiences, and strive to go beyond past experiences to produce new constructs (Vygotsky, 2004). Furthermore, according to Tsai (2012), imagination can form the ability to think creatively.

2.4. Positive Psychological Capital

Luthans, Luthans, & Avey (2014) define Psychological Capital (PsyCap) is a positive individual psychological development condition characterized by: (1) having the efficacy to take and place

the necessary effort to succeed in a challenging task; (2) make a positive attribution (optimism) about succeeding now and in the future; (3) be diligent toward the goal, and if necessary, redirect to the goal (hope) to succeed; and (4) when overwhelmed by problems and difficulties, retaining and bouncing back and even surpassing (resilience) to achieve success.

Sweetman et al. (2010) stated that positive psychological capital has a relationship with creativity performance and is a predictor of creativity. Also, positive feelings, both positive feelings in general and the induced feelings of happiness in two experimental manipulations can increase the production of creative, divergent thinking (Fernández-Abascal & Díaz, 2013).

2.5. Research Conceptual Framework

Challenges and needs in the future demanding higher education can prepare a superior and competitive human resources. One of them needs human resources that have creativity and innovation. Several previous studies have suggested that affective creativity is a predictor of creative thinking ability (Lewis et al., 2011), future imagination can form thinking skills (Tsai, 2012), and positive psychological capital is also predictors of thinking creative (Sweetman et al., 2010).

Through the use of latent variable modeling, we tested the hypothesis that affective creativity, future imagination, and positive psychological capital were predictors of creative thinking ability (Figure 1).

METHODS

3.1. Participant

This study utilized university students as participants. The total number of students at the School of Humanities and Applied Sciences targeted in this study are 852 including bachelor, graduate, and postgraduate students (539, 247, and 66 respectively). An acceptable sample consists of 278 students of the School of Humanities and Applied Science from one of National University located in Central Taiwan completed the questionnaires (Yamane, 1967). It consists of 96 (35%) male and 182 (65%) female; and undergraduate 155 (56%) and graduates 123 (44%) students (table 1).

3.1. Instrument

3.2.1. Creative thinking scale

Students' creative thinking was measured using the Chinese edition of creative thinking scale (Xu & Tien, 2002). This instrument consisted of two primary constructs: originality (9 items) and flexibility (8 items). The reliability of overall creative thinking scale was 0.743, and the internal consistency of each construct were 0.838 and 0.776 respectively.

3.2.2. The imagination of future scale

The imagination of a future scale in Chinese edition was designed to measure the extent to which students able to conceptualize something in future (Wu, Chang, Chiu, & Chen, 2013). The original

instrument comprised of four constructs including beyond reality, emotion and value, past review and future predict, and situation construction. The reliability of the overall instrument was high (0.908). Furthermore, the Cronbach alpha for each construct were 0.906, 0.841, 0.855 and 0.805 respectively. This study employed two constructs that highly related to the purposes of this study: past review and future predict and situation construction (5 and 6 items respectively).

3.2.3. Affective creativity scale

The learners' attitude toward creativity was measured using the Chinese edition of affective creativity scale (Xia, 2008). This instrument consisted of three constructs including seven items of curiosity, seven items of imagination, and four items of adventure. Furthermore, the internal consistency of the overall instrument was high (0.868), and the reliabilities of each construct: curiosity, imagination, and adventure were acceptable (0.723, 0.800, and 0.553 respectively).

3.2.4. Positive Psychological capital scale

The students' positive psychological capital instrument in Chinese edition adapted from Yu (2015) was utilized in this study. This scale used comprised of four main affective domains including self-efficacy (6 items), optimism (4 items), resilience (4 items), and hope (4 items). Moreover, this instrument was declared to possess high reliability (0.94) for the overall instrument, and the internal consistencies of self-efficacy, optimism, resilience, and hope were high (0.90, 0.87, 0.84, and 0.85 respectively). All the instruments in this study took a five-point Likert scale (strongly disagree to agree strongly)

RESULTS

4.1. Validities and reliabilities instruments in this study

The Pearson product moment correlation tests results showed that the creative thinking, affective creativity, future imagination, and psychological capital instruments were valid and reliable. All the instruments' items possessed a significant validity (0.301** ~ 0.757**) (Hair, Black, Babin, & Anderson, 2010). Furthermore, overall instruments, creative thinking (0.802), affective creativity (0.842), future imagination (0.841), and psychological capital (0.872), were having good internal consistency ($\alpha > .700$) (Hair et al., 2010). It indicated that the instruments were valid and reliable, and competent enough to measure students' creative thinking, affective creativity, imagination, and psychological capital.

4.2. Students' performance and correlations among the variables

Students' psychological capital (3.59) achieved highest score compare with its affective creativity (3.53), creative thinking (3.39), and imagination (3.45) (Table 2). It indicated that this university students have an above average levels of hope, resilience, self-efficacy, and optimism. Furthermore, the Pearson coefficient analyses were employed to analyze the correlations among students' affective creativity, imagination, psychological capital, and creative thinking. The results revealed that students' creative thinking positively related to affective creativity, imagination, and

positive psychological capital (.681**, .561**, and .622**) (Table 2). There were also significant relationships between affective creativity and imagination (.649**); affective creativity and psychological capital (.579**); and imagination and psychological capital (.608**). These strong relationships among the four variables indicated that any change in the one variable might affect the other three variables (Field, 2013).

4.3. Gender and level of study differences

An independent T-test was employed to identify if there were differences between the male and female students; and undergraduate and graduate students. There were no significant differences between male and female students in affective creativity, creative thinking, imagination, and psychological capital (Table 3).

Furthermore, there was 155 undergraduate, and 123 graduate students participated in this study. The t-test results showed that there were no significant differences between undergraduate and graduate students' affective creativity, creative thinking, imagination, and psychological capital (table 4).

4.4. The measurement model of factors influencing creativity

The confirmatory factor analysis (CFA) in this study indicated that collaborations among the affective creativity, imagination, and psychological capital significantly influence students' creative thinking. The measurement model had a good fit to the empirical data analysed: Minimum discrepancy per degrees of freedom (CMIN/DF= 2.44 < 3) indicate the good fit (Byrne & Campbell, 1999); Root-Mean-Square Error of Approximation (RMSEA= .072 < .080) represent an acceptable fit (Byrne & Campbell, 1999); and Goodness of Fit Index (GFI= .996 > .900); Comparative Fit Index (CFI= .997 > .900), and Normed Fit Index (NFI=.995 > .900) represent a good fit (Byrne & Campbell, 1999).

The measurement model (figure 2) show that affective creativity and psychological capital had a significant and direct impact on creative thinking (.48*** and .33***). The direct effect of imagination to creative thinking cannot be revealed due to the degree of freedom allowed (DF > 0) to get an acceptable model fit for the measurement model.

Furthermore, this study further calculated the direct and indirect effects of affective creativity, imagination, and psychological capital on the students' creative thinking (table 5). The results showed that affective creativity collaboratively with individuals' imagination and psychological capital created multi-level indirect effects (.68***) on the students' creative thinking. This indirect effect is higher than the direct effect of affective creativity on students creative thinking (.48***). This fact confirmed theory that creative thinking was developed through a combination of several factors that were collaboratively influencing individuals' cognitive ability to creatively solve problems (Cropley & Cropley, 2013).

DISCUSSION

Students' performance

There were no differences between the male and female students' affective creativity, imagination, psychological capital, and creative thinking. It seems that there are no gender dissimilarities in Taiwan. The current situation in Taiwan also revealed that a woman is possible to achieve the highest position in the government as a president. The Taiwan Ministry of Interior (MOI, 2013) revealed that in 2013 Taiwan has low gender ratio (99.28) or the number of man for every 100 women. In practice, teachers in universities need to provide the equal opportunities to both male and female students to develop their own cognitive, mental, and skill abilities. Teaching-learning activities without differentiate gender can improve both male and female students' academic achievement (Miller & Halpern, 2014).

In addition, there were no significant differences between undergraduate and graduate students' affective creativity, imagination, psychological capital, and creative thinking. The results in this study cannot be used to challenge the previous studies (e.g., Hilton, 2015; Sandri, 2013) that declaimed education institution plays a crucial role on students' creativity enhancement. First, the students who study in the graduate schools might come from the various background. In Taiwan, the school of humanities and applied sciences that provides teacher education program have various types of the student from engineering, math, natural sciences, arts, sports, and social sciences (Liu, 2015). Second, this study unrevealed the process of teaching-learning activities within the school. Harris (2014) suggested creative problem solving, brainstorming, brain writing, metaphoric thinking, and computer-aided teaching to improve students' cognitive ability. Hence, a further study to identify the types of learning model had been implemented, and develop well-designed curricula to enhance the students' mental and intellectual achievement is crucially needed.

Influential factors of students' creative thinking

Creative thinking is crucial for an individual in this disruptive era because new innovative technologies are continually and rapidly developed (Shoop, 2013). For instance, the new skill that the students achieved in the school might be no longer suitable for the requirement needed when they are graduating. Therefore, individual ability to solve problems through the original ideas generation and adaptation should be developed and trained in the university setting (Starko, 2014).

The results of this study align with previous studies that revealed students' creative thinking might be fostered through a combination of several personalities factor (Cromptley & Cromptley, 2013; M. Wu, Siswanto, & Ko, 2017). Therefore, stakeholders at the university might try to improve students' affective creativity, imagination, and psychological capital in the educational setting. Affective creativity in recent study consists of curiosity, imagination, and adventure (Sundem, 2014). It might be fostered through some strategies, for example, complex problem solving (Lai & Hwang, 2014) and students exchanging or international collaboration (Maynes, Allison, & Julien-Schultz, 2013). International experiences enhance students' cognitive and affective ability

because they can discover themselves just a small part of the worldwide community, fostering their curiosity, imagination, and spirit to discover more new friends and culture arise (Kabilan, 2013).

The students' imagination in this study consists of future plot and prediction. Vygotsky (2004) theory about individuals' ability to create in mind something that is unreal or not happen yet is influenced by their experiences. The results of this current study indicated that graduate students' imagination is higher than undergraduate students' imagination, but it was insignificant. It seems that the higher education level improves students' ability to conceptualize what will happen in the future. However, students need to take more experiences because it happens that some individuals have fewer experiences than their younger counterpart.

Also, psychological capital significantly influences students' creative thinking (Fernández-Abascal & Díaz, 2013). Teachers should recognize students' psychological capital as a valuable learning outcome, suggesting the importance of managing resource and classroom activities to develop and improve the psychological capital of the learners (You, 2016). Luthans et al. (2014) empirical study revealed that individuals' psychological capital might be effectively improved through a short training program. Therefore, such kind of training might be implemented not only to improve students' psychological capital, but it will further enhance students' creative thinking.

CONCLUSION AND SUGGESTION

The results of the study reveal that affective creativity, imagination, and psychological capital collaboratively influence students' creative thinking development. It adds to the literature related to the individual's creativity development within an educational setting. In practice, educators and university stakeholders should promote a supportive learning environment and more experiences to strengthen not only students' academic achievement but also their positive mental and cognitive achievement.

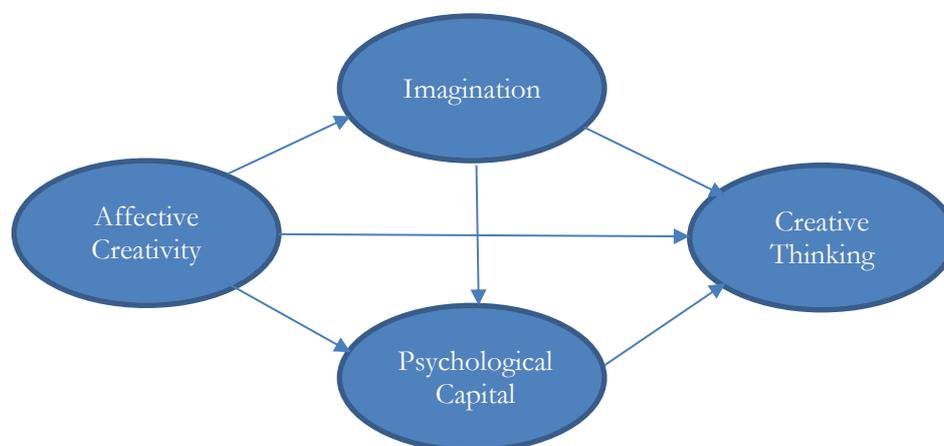


Figure 1. The research conceptual framework

Table 1 Background of participants (N-278)

Attribute	Categories	N	%
Gender	Male	96	35
	Female	182	65
Degree	Undergraduate	155	56
	Graduate	123	44

Table 2. Students' performance and correlations among the variables (N = 278)

	Mean	SD	1	2	3	4
1. Affective Creativity	3.53	.464	1			
2. Creative Thinking	3.39	.440	.681**	1		
3. Imagination	3.45	.592	.649**	.561**	1	
4. Psychological Capital	3.59	.551	.579**	.622**	.608**	1

Table 3. Gender differences

Variables	Male	Female	t	Sign
1. Affective Creativity	3.54	3.53	.239	.811
2. Creative Thinking	3.44	3.38	1.05	.295
3. Imagination	3.48	3.44	.477	.634
4. Psychological Capital	3.66	3.57	1.32	.188

Note: * $p < .05$

Table 4. Level of study differences

Variables	Undergraduate	Graduate	t	Sign
5. Affective Creativity	3.53	3.53	.026	.979
6. Creative Thinking	3.40	3.40	-.013	.990
7. Imagination	3.43	3.48	-.785	.433
8. Psychological Capital	3.57	3.64	-1.06	.288

Note: * $p < .05$

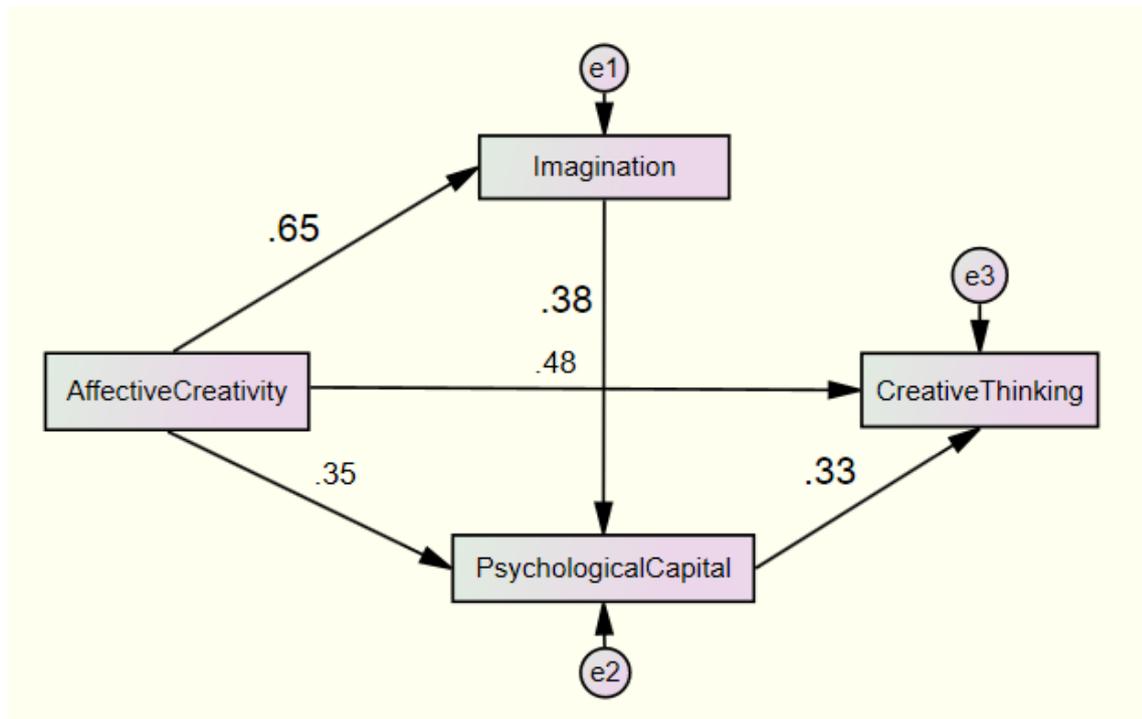


Figure 2 The hierarchical model of students' creative thinking

Table 5. Direct and indirect effect of affective creativity, imagination, and psychological capital on students' creative thinking

	Direct	Indirect	Total
Affective creativity → creative thinking	.48	.20	.68
Imagination → creative thinking	.00	.13	.13
Psychological capital → creative thinking	.33	.00	.33

REFERENCE

- Antonietti, A., & Iannello, P. (2008). *Representing the mind: A collection of instruments to assess naïve psychological conceptions*. Milano, Italy: Polimetrica International Scientific Publisher.
- Byrge, C., & Hansen, S. (2009). The creative platform: a didactic approach for unlimited application of knowledge in interdisciplinary and intercultural groups. *European Journal of Engineering Education*, 34(3), 235–250. <https://doi.org/10.1080/03043790902902914>
- Byrne, B. M., & Campbell, T. L. (1999). Cross cultural comparison and the presumption of equivalent measurement and theoretical structure. *Journal of Cross-Cultural Psychology*, 30(5), 555–574.
- Cropley, D. H., & Cropley, A. J. (2013). *Creativity and crime: A psychological approach*. Cambridge, UK: Cambridge University Press.



- Eisele, P. (2017). Perceived organizational innovativeness: The difference between individual and social creativity. *International Journal of Innovation, Creativity and Change*, 3(2), 129–139.
- Fernández-Abascal, E. G., & Díaz, M. D. M. (2013). Affective induction and creative thinking. *Creativity Research Journal*, 25(2), 213–221. <https://doi.org/10.1080/10400419.2013.783759>
- Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th Editio). London: Sage Publication.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective* (7th.). Upper Saddle River: Pearson Prentice Hall.
- Harris, L. V. A. (2014). *Idea engineering: Creative thinking and innovation*. New York: Momentum press.
- Hilton, M. (2015). Preparing students for life and work. *Issues in Science and Technology*, 31(4), 63.
- Kabilan, M. K. (2013). A phenomenological study of an international teaching practicum: Pre-service teachers' experiences of professional development. *Teaching and Teacher Education*, 36, 198–209.
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four C model of creativity. *Review of General Psychology*, 13(1), 1–12. <https://doi.org/10.1037/a0013688>
- Kaufman, S. B., Quilty, L. C., Grazioplene, R. G., Hirsh, J. B., Gray, J. R., Peterson, J. B., & Deyoung, C. G. (2016). Openness to Experience and Intellect Differentially Predict Creative Achievement in the Arts and Sciences. *Journal of Personality*, 84(2), 248–258. <https://doi.org/10.1111/jopy.12156>
- Lai, C. L., & Hwang, G. J. (2014). Effects of mobile learning time on students' conception of collaboration, communication, complex problem-solving, meta-cognitive awareness and creativity. *International Journal of Mobile Learning and Organisation*, 8(3–4), 276–291.
- Lewis, S., Dontcheva, M., & Gerber, E. (2011). Affective computational priming and creativity. In *CHI '11 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 735–744). Vancouver, BC, Canada. <https://doi.org/10.1145/1978942.1979048>
- Liang, C., Chang, C., Chang, Y., & Lin, L. (2012). The exploration of indicators of imagination. *The Turkish Online Journal of Educational Technology*, 11(3), 366–374.
- Liang, C., Hsu, Y., Chang, C. C., & Lin, L. J. (2012). In search of an index of imagination for virtual experience designers. *International Journal of Technology and Design Education*, 11(3), 366–374. <https://doi.org/10.1007/s10798-012-9224-6>.
- Liu, T. C. (2015). Taiwan teacher preparation program evaluation: Some critical perspectives. *Policy Futures in Education*, 13(4), 518–528.



- Luthans, B. C., Luthans, K. W., & Avey, J. B. (2014). Building the leaders of tomorrow: The development of academic psychological capital. *Journal of Leadership & Organizational Studies*, 21(2), 191–199.
- Maynes, N., Allison, J., & Julien-Schultz, L. (2013). An examination of longevity of impact of an international practicum experience on teachers' beliefs and practices four years later. *International Education Studies*, 6(4), 154.
- Miller, D. I., & Halpern, D. F. (2014). The new science of cognitive sex differences. *Trends in Cognitive Sciences*, 18(1), 37–45.
- MOI. (2013). Taipei has lowest gender ration in Taiwan. Retrieved July 5, 2018, from <http://focustaiwan.tw/news/asoc/201607240005.aspx>
- Muñoz-Blanco, M. I., & Vargas, M. A. P. (2017). Respondent conditioning training effect on the behavior of the audience of creativity. *International Journal of Innovation, Creativity and Change*, 3(2), 18–32. Retrieved from http://www.ijicc.net/images/Vol_3_iss_2_nov_2017/Maria_Isabel_Muñoz-Blanco_Nov_2017.pdf
- NACCCE. (1999). All our futures: Creativity, culture & education. Retrieved June 17, 2018, from <http://sirkenrobinson.com/pdf/allourfutures.pdf>
- Robinson, K. (2011). *Out of Our Minds: Learning to be Creative* (Revised an). United Kingdom: Capston. Retrieved from <http://www.fredkemp.com/5365su12/robinsonchpt123.pdf>
- Rojas, J. P., & Tyler, K. M. (2018). Measuring the creative process: A psychometric examination of creative ideation and grit. *Creativity Research Journal*, 30(1), 29–40. <https://doi.org/10.1080/10400419.2018.1411546>
- Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, 24, 92–96. <https://doi.org/10.1080/10400419.2012.650092>
- Sandri, O. J. (2013). Exploring the role and value of creativity in education for sustainability. *Environmental Education Research*, 19(6), 765–778.
- Shoop, B. L. (2013). Developing critical thinking, creativity and innovation skills of undergraduate students. In *Education and Training in Optics and Photonics* (p. ETbC1). New York: Optical Society of America.
- Starko, A. (2014). *Creativity in the Classroom*. New York: Routledge.
- Sternberg, R. J. (2010). The Nature of Creativity. *Creativity Research Journal*, 18(1), 87–98. <https://doi.org/10.1207/s15326934crj1801>



- Sternberg, R. J., & Lubart, T. I. (1996). Investing in creativity. *American Psychologist*, 51, 677–688. <https://doi.org/10.1037/0003-066X.51.7.677>
- Sundem, G. (2014). Openness and the brain's PMTG are “affective” and “cognitive” components of creativity.
- Sweetman, D., Luthans, F., Avey, J. B., & Luthans, B. C. (2010). The relationship between positive psychological capital and creative performance. *Canadian Journal of Administrative Sciences*, 28(1), 4–13. <https://doi.org/https://doi.org/10.1002/cjas.175>
- Torrance, E. P. (1981). Predicting Creativity Elementary of Elementary School Children (1958-80) and the Teacher Who “Made a Difference.” *Gifted Child Quarterly*, 25(2), 55–62.
- Tsai, K. C. (2012). Play, imagination, and creativity: a brief literature review. *Journal of Education and Learning*, 1(2), 15–20. <https://doi.org/10.5539/jel.v1n2p15>
- Vygotsky, L. S. (2004). Imagination and creativity in childhood. *Journal of Russian and East European Psychology*, 42(1), 7–97.
- Wu, I. C., Chang, Y. L., Chiu, F. C., & Chen, H. C. (2013). Nurture of futures imagination and creative talent in senior high school. *Journal of Chinese Creativity*, 4(2), 57–78.
- Wu, M., Siswanto, I., & Ko, C. (2017). The influential factors and hierarchical structure of college students' creative capabilities—An empirical study in Taiwan. *Thinking Skills and Creativity*, 26, 176–185.
- Wu, M., Siswanto, I., Suyanto, W., Sampurno, Y. G., & Tan, W. (2018). Creative Thinking Curriculum Infusion for Students of Teachers' Education Program. *Jurnal Pendidikan Teknologi Dan Kejuruan*, 24(1), 1–12.
- Xia, W. T. (2008). *The research on attachment style and creativity among college students*. National Chengchi University.
- Xu, L. E., & Tien, W. P. (2002). Cognitive styles and creativity. *Cognitive Styles and Creativity*, 23, 33–40.
- Yamane, T. (1967). *Statistics: An introductory analysis* (2nd Ed.). New York: Harper and Row.
- You, J. W. (2016). The relationship among college students' psychological capital, learning empowerment, and engagement. *Learning and Individual Differences*, 49, 17–24.
- Yu, W. C. (2015). *Psychological capital, job stress and retention for public preschool teachers as directors in New Taipei City*. Fu Jen Catholic University.



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