



Pre-Service Preschool Teachers' Metacognitive Awareness and Creative Thinking Domains

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Abstract

The aim of this study is to identify the relationship between pre-service preschool teachers' metacognitive awareness and creative thinking domains and the predictive level of metacognitive awareness on creative thinking domains. This study following creative domains were examined: scholarly, performance (art), everyday/self and artistic creativity. The study conducted on 374 pre-service preschool teachers, 314 female and 60 male, were reached out through purposive sampling method. Ages ranged from 18 to 36 (Mean= 19,27, SD=6.96). "Kaufman Domains of Creativity Scale" (K-DOCS) and "Metacognitive Awareness Inventory" were used as data collection tools. Descriptive statistic was performed. Correlation analysis was run to determine the relationship between metacognitive thinking and creativity and creative domains. And also regression analysis was performed to identify the predictive level of the metacognitive thinking on creative thinking domains. Findings show that significant relationship was found between metacognitive awareness and creative thinking domains sub-dimensions of the scale (scholarly, performance, everyday/self and artistic), Metacognitive awareness significantly predicted creative thinking domains. The predictive levels varied by creative domains. Metacognitive awareness predicts scholarly and everyday/self creativity at the highest rate. The findings obtained in the present study yielded similar results of studies on metacognitive thinking and creativity in the literature.

Keywords: Metacognitive Awareness, Creative Thinking, Preschool Education, Creative Thinking Domains

Introduction

Creative thinking skills are one of the crucial needs of our era. Those who demonstrate self-awareness alongside organization skills during the creative process may highly influence the quality of the information or product to be produced. Creative thinking and metacognitive thinking skills thus play a key role in achieving 21st century education goals.

Creative Thinking

Various definitions of creative thinking have been identified in the literature. To illustrate; creativity is defined as an ability to bring forward different and innovative ideas, to transform something well known into a new context, to produce meaningful responses (Sternberg and Grigorenko, 2004; Sternberg and Williams, 1996) and to solve problems and define new questions (Gardner, 1997).

Gardner (2006, 2009) claims that individuals have also multiple intelligences except than creative skills. Regarding the Gardner's theory of multiple intelligences, individuals exhibit high level of creative skills in one domain. According to the Gardner's definition, creative skills influence not only the environment in which the individual lives but also wider social circles. Gardner (2006) highlights that only a few genius people have the ability to demonstrate creative skills in more than one area.

Creativity is the process of generating new, unusual ideas. Personality characteristics of individuals and the environment in which they live are thus significant parts of the creative process. In this respect, theoretical studies have shed light on the effects of individual and environmental factors on creative thinking. To exemplify, several other studies have supported the claim that positive and adverse attributes of the environment influence creative personality (Amabile, 1993; Csikzentmihalyi, 2006) and individuals' creative aspects also highly contribute to changes in the environment (Csikzentmihalyi, 2006). Similarly, Feldman (2006) says creativity is shaped by personal traits such as cognitive processes, social/emotional processes and environmental factors such as family aspects, education, sociocultural contextual aspects and historical trends.

Sternberg and Kaufman (2007) assert that creative work is considered anonymous in many cultures and believed to belong to the community. Given that creative thinking is not just linked to personal traits and affected by environmental factors, varying degrees of creativity have been identified. Because social and environmental factors should be taken into account in creativity (Amabile, 1982).

Creativity has been conceived broadly in the literature. However, some theorists acknowledge that creativity is considered as domain-specific as well. These domain-specific areas address to individuals who demonstrate creative habits in different disciplines such as science, art and engineering and etc. (Collins and Amabile, 2006, Gardner, 2006, Kaufman, 2012, Baer and Kaufman, 2005). Amabile (1982) used a product-oriented definition of creativity suggesting that creativity is realized through domain-specific product experience.

Individuals display high level of creativity when domain-relevant skills, creativity-relevant processes, and intrinsic task motivation are interrelated with each other. This is called “creativity intersection” and this intersection is crucial for enhancing creativity (Collins and Amabile, 2006).

In an effort to provide a framework as to domain-specific creativity, Baer and Kaufman (2005) proposed “Amusement Park Theoretical (APT)” model. This model is the metaphor. Baer

and Kaufman (2005) explains the metaphor of an amusement park as follows:

“First there are initial requirements (intelligence, motivation, and environment) that must be present at some level for all creative work - much as you need certain basic requirements in order to go to an amusement park (e.g., transportation, a ticket). Next, there are general thematic areas in which someone could be creative (e.g., the arts, science); this level is the equivalent of deciding which type of amusement park to visit (e.g., a water park or a zoo). The next level focuses on more specific domains - within the general thematic area of “the arts,” for example, could be such varied domains as dance, music, art, and so forth (p.159).”

Baer and Kaufman (2005) pose that “this model attempts to integrate both domain-general and domain-specific views of creativity. The first level (initial requirements) is very general, and each subsequent level gets more and more domain-specific” (p.160). Domain-specific ideas emerge in the final phase. Consequently, you result in one specific-domain. At this point, micro-domains are determined. Those areas represent specific tasks related to each domain. Current and past environmental attributes are important. Environmental factors that promote and do not promote creative thinking affect this dimension (Baer and Kaufman, 2005).

Although many definitions and explanations of creativity are concerned with novel, unique and free thinking elements, creative ideas and products have an organized and systematic structure. Sternberg and Grigorenko (2000) acknowledge that knowledge is a double-edged sword during the creative thinking process and correspondingly definitions must be identified in this respect. One cannot be creative without knowledge and they should be aware of the existing state of the knowledge to change and transform the knowledge. For instance an individual should have a knowledge of current computer features in order to create a computer with exclusive features.

However, Sternberg and Griogrenko (2000) highlight that knowledge limits individuals during the generation of creative idea and prevent them from bringing out novice ideas. In this sense, the awareness of individuals is highly vital.

Metacognition and Metacognitive Awareness

Metacognition thinking includes knowledge, regulation and practice of one's cognition. Metacognitive skills help the individual acquire and monitor information (Fisher, 1998). Individuals who use their metacognitive skills evaluate their decisions from multiple perspectives, organize their skills and apply them to their lives. Besides, they deepen and assess their experiences. Following the self-assessment, individuals make the appropriate adjustments, when required, and consequently. They have a purpose and self-awareness as to how to move for their next experience. Therefore, metacognitive skills include planning, guessing, controlling and evaluating phases. (Fisher, 1990, Livingston, 2003, Presesisen, 1985, Beyer, 1984). Individuals also use their self-monitoring and self-regulation skills in metacognitive thinking skills. (Fisher, 2009).

Metacognitive thinking is divided into three elements: knowledge, experience and knowledge about strategy. These three elements involve self- knowledge, self-awareness of one's own experiences and accordingly regulation of strategies. In this respect, evaluation of progress and goals and monitoring are important (Flavel, 1979). In metacognitive thinking, the first phase is awareness. Schraw and Dennison (1994) define "Metacognitive awareness allows individuals to plan, sequence, and monitor their learning in a way that directly improves performance" (p.460).

Self-aware and self-directed individuals in terms of creativity yield successful outcomes. Metacognitive awareness is a key factor in guiding individuals' self-awareness and skills. Schraw & Moshman (1995) stress out that many students including university students need to be supported in terms of metacognitive knowledge and regulation skills. In addition to that, students need to be aware of their own knowledge and improve their regulation skills.

Metacognitive Thinking and Creativity

More recent theoretical approaches suggest that creative thinking and metacognitive thinking skills need to be considered together. Accordingly, Kaufman and Baghetto (2013) define "Creative Metacognition (CMC) as a combination of creative self-knowledge (knowing one's own creative

strengths and limitations, both within a domain and as a general trait) and contextual knowledge (knowing when, where, how, and why to be creative)" (p.160). Kaufman and Baghetto (2013) assert that when individuals use their metacognitive thinking skills, they know when, where and why to be creative and act correspondingly. CMC also involves traits connected with metacognition.

Lincola et al., (2017) refers to the concept of metacreativity and define it as a deep thought system. The system can be associated with the capability to reflect on one's own creative processes and to adjust them. Metacreativity is a fundamental component of the creative system that might be implied to have intrinsic motivation or creative autonomy. Self-awareness is a key concept (Lincola et al., 2017). In metacognitive creativity with high level of creative thinking skills, self-awareness is significant. The individuals who lack self-awareness are unable to develop themselves and regulate the process effectively.

Accordingly, Answers to the Following Questions were Sought

- a. Is there any relationship between total scores of pre-service teachers' metacognitive awareness and creative domains (scholarly, performance (art), everyday/self and artistic creativity)?
- b. Does metacognitive awareness predict creative domains in terms of sub-dimension levels (art, everyday/self and artistic creativity) ?

Method

Screening model was employed in this study. Since the present study aims to identify the relationship between pre-service teachers' metacognitive awareness and creative thinking domains alongside the predictive level of metacognitive awareness on creative domains, screening model was used.

Participants

The working group of the study consists of students majoring in pre-school education department. 374 pre-service teachers (314 female and 60 male) were reached out through purposive sampling method. Ages ranged from 18 to 36 (Mean= 19,27, SD=6.96).

Data Collection Tools

The Kaufman Domains of Creativity Scale (K-DOCS)

It was developed in 2012 by Kaufman. The scale is based on the idea of creativity across different domains. The Kaufman Domains of Creativity Scale (K-DOCS) is originally a 50-item rating scale. The scale includes five sub-scales: scholarly, mechanical/scientific, performance (art), everyday/self and artistic creativity.

The scale is measured by total scores and sub-factors. The higher scores of the scale imply higher level of creativity. A 5-point Likert scale was employed in the study. Explanatory Factor Analysis was administrated to two separate samples for validation.

The internal consistency of the scale in the everyday/self and scholarly creativity was .86, .86 and .86 for the first, second and total sample, .87, .87 and .87 for performance (art) creativity, .87, .86 and .86 for scientific/mechanic creativity and .83, .82 and .83 for artistic creativity. Test-retest reliability of the scale was found between .76 and .86. The criterion related validity was tested using five sub-factors and significant relationship was found among themselves ($p < .01$) (Cited in: Şahin, 2016).

The Turkish version of the scale was administrated to a group of highly gifted children in high school. Explanatory Factor Analysis was performed to determine validity of the instrument. The five-factor structure of the 42-item was obtained. The Cronbach's Alpha internal consistency coefficient ranged from .87 to .77 in the sub-factors of the scale. The coefficient of the total scale was calculated as .90. The discriminant validity of subscales was examined based on the differences of mean scores of lower and upper level groups. A significant difference between the 27 % of scores of lower and upper level groups were discovered ($t(69) = -62.277, -129.235, -74.747, -150.421$ and $-145.253, p < .01$).

This study was applied four subscales: scholarly, performance (art), everyday/self and artistic creativity. Because training for pre-service teachers involve the properties of four dimensions.

Metacognitive Awareness Inventory

The inventory was developed by Schraw and Dennison (1994) in order to measure the

metacognitive awareness. The inventory consisted of 52 items. The inventory has two major dimensions and eight sub-factors. 5 point Likert Scale was employed. General metacognitive dimensions comprise of the knowledge of cognitive and regulation of cognitive. The knowledge of cognitive provides information on cognitive process of the individual, learning strategies to be used and when these strategies will be beneficial. The regulation of cognition comprises five skills: planning, information management strategy, comprehension monitoring, debugging strategy, and evaluation. Metacognitive knowledge contains three kinds of knowledge: declarative, procedural, and conditional knowledge. The Metacognitive regulation includes planning, monitoring, debugging and information management strategy (Schraw and Dennison, 1994, Cited in: Akın, Abacı and Çetin, 2007).

The scale was developed using explanatory factor analysis. As a result of the analysis, it was observed that eight sub-factors within two major dimensions explained 65% of the sampling variance. The factor loadings ranged between .31 to .70. The internal consistency coefficients of the whole inventory were identified .95 and the subscales ranged from .88 to .93 (Schraw and Dennison, 1994).

The inventory was adapted to Turkish by Akın, Abacı and Çetin (2007). The study was administrated to university students. The validity of the scale was tested using explanatory factor analysis and concurrent validity. In the explanatory scale, eight sub-dimensions were determined in the major dimensions of the knowledge of cognition and regulation of cognition. .95 correlation value was found between two scales in the concurrent validity. Language equivalence coefficient was found .93. The internal consistency coefficient and retest reliability coefficients were calculated. In light of the item analysis performed item-test correlations of the sub-scales were found between .35 and .65. The internal consistency coefficients and retest reliability coefficients were identified .95.

Data Collection and Data Analysis

Scales were administrated to pre-school pre-service teachers to collect the data. Correlation analysis was run to determine the relationship

between metacognitive thinking and creativity and creative domains. Additionally, regression analysis was performed to identify the predictive level of the metacognitive thinking on creative thinking domains.

Findings

The present study investigates the relationship between metacognitive awareness & sub-factor levels of creativity domains. The results of the descriptive statistics & correlation test were tabulated in Table 1.

Descriptive Statistics and Correlation Analysis

Table 1: Pearson's (r) Correlation Analysis Results Regarding the Relationship Between the Domains of Creative Thinking and Metacognitive Awareness

Variables	M	SD	1.	2.	3.	4.	5.
1. Metacognitive awareness	188,15	28,56	1	,544*	,337*	,543*	,368*
2. Scholarly	36,23	8,04	,544*	1	,498*	,575*	,536*
3. Performance	26,78	8,68	,337*	,498*	1	,385*	,579*
4. Self/ Everyday	36,97	7,81	,543*	,575*	,385*	1	,538*
5. Artistic	12,25	4,06	,368*	,536*	,579*	,538*	1

N=374;, *p<.01

From Table 1, it is seen that there is a significant relationship between the scores of metacognitive awareness and creativity domains.

Regression Analysis

A simple regression analysis was performed to determine whether the metacognitive awareness predict creative domains. In terms of total score and sub-dimension levels, creative domains were accepted as dependent variable, whereas metacognition awareness was analyzed as independent variable. The findings were detailed below.

Table 2: The Predictive Power of the Metacognitive Awareness on Scholarly Creativity

	B	SE B	β	t	p
Constant	7,411	2,330		3,180	,002
Metacognitive Awareness	,153	,012	,544	12,510	,000

R= ,544 R²= ,296 F= 156,489 p<.01

Looking at Table 2, we can observe that the metacognitive awareness significantly predicts the scholarly creativity (R²=.296, F=156.489, p<.01). The metacognitive awareness explains 29.6 % of the variance in the scholarly creativity.

Table 3: The Predictive Power of Metacognitive Awareness on Performance Creativity

	B	SE B	β	t	p
(Constant)	7,483	2,825		2,649	,008
Metacognitive Awareness	,103	,015	,337	6,908	,000

R= ,337 R²=,114 F=47,727 p<.01

According to the data in Table 3, metacognitive awareness significantly predicts the variance of awareness on performance creativity (R²=,114 F=47,727, p<.001) and metacognitive awareness explains of 11.4 % variance in performance creativity domains.

Table 4: The Predictive Power of the Metacognitive Awareness on the Artistic Creativity

	B	SE B	β	t	p
(Constant)	2,394	1,306		1,833	,068
Metacognitive Awareness	,052	,007	,368	7,630	,000

R= ,368 R²=,135 F=58,220 p<.01

When we look at Table 4, the contribution of metacognitive awareness to the academic creativity is significantly meaningful (R²=,135, F=58,220, p<.01) and metacognitive awareness explains of 13.5 % the variance in the artistic creativity domain.

Table 5: The Predictive Power of the Metacognitive Awareness on Self \ Everyday Creativity

	B	SE B	β	t	p
(Constant)	9,016	2,266		3,980	,000
Metacognitive Awareness	,149	,012	,543	12,481	,000

R=,543 R²=,295 F=155,766 p<.01

Considering the data in Table 5, it is observed that the contribution of metacognitive awareness to the variance of awareness on the academic creativity is significantly meaningful (R²=,295 F=155,766 p<.01). The metacognitive awareness explains of 29.5% the variance in everyday creativity domain.

Conclusion and Discussion

The current study attempted to identify the relationship between metacognitive awareness and creative thinking domains and the predictive level of metacognitive awareness on creative thinking domains. Significant relationship was found between metacognitive awareness and creative thinking domains. Additionally, metacognitive awareness significantly predicted creative thinking domains. However, the predictive levels varied by creative domains.

Puryear's (2015) study investigated the moderating effect of the metacognitive awareness on creative ideas and creative production. As a result of the study, a relationship was detected between metacognitive awareness and creative production. Creative ideas and metacognitive awareness had a significantly moderating effect on creative production and creative ideas as well. In a study conducted by Demir and Şahin (2014), prospective science teachers' metacognition and creativity perceptions were assessed in terms of scientific creativity. The results from this study indicated that prospective science teachers used their metacognitive skills to demonstrate their creative skills. Prospective science teachers also utilized such metacognitive skills as seeking alternative solutions to find the best solution, developing strategies and analyzing their mistakes. Concordantly, the findings obtained in the present study yielded similar results.

Similar results were also emerged from the studies on metacognitive thinking and creativity in the literature. In this respect, Feldhausen (1995) stresses that metacognitive thinking plays a vital role in creative process. In view of the findings obtained, significantly positive relationship were detected between total and sub-dimension scores of the metacognitive awareness and creative thinking domains.

Feldhausen and Goh (2010) point out that creative thinking is connected with cognitive activities such as critical thinking, decision-making and metacognition. During the creative problem solving processes, individuals strive to find unique solutions to challenging problems and thus employ metacognitive skills such as analyzing, monitoring and evaluating.

According to the theory of successful intelligence formulated by Robert Sternberg, it is necessary to review the problem, to discuss and analyze assumptions, to define handicaps and provide and apply solutions in order to develop creative thinking. Another point underlined by the theory of successful intelligence is the combination of analytical, creative, and practical abilities as well as the individuals' competencies as to where and when to use these three skills (Sternberg & Grigorenko, 2007). Therefore, recent theoretical works focus on one's self-awareness, strengths and weaknesses and self-regulation, that is to say, to be aware of one's own skills (Flavell, 1987, Brown and Reeve, 1985, Nelson and Narens, 1990, Schraw and Dennison, 1994).

Kaufman and Beghetto (2013) developed the concept of creative metacognition where they discussed creative thinking and metacognitive thinking skills together and explored the relationship between them. According to Kaufman and Beghetto (2013), metacognitive thinking is a special formula of the cognition in creative thinking. In this respect, it refers to the one's self-awareness about his or her own potential, monitoring, evaluating and maximizing his or her creative potential. These features comprise general and specific domains of the creativity. Individuals with higher metacognition know their weaknesses and strengths and design and regulate when and how to implement creative potentials. For

this reason, the individuals use their self-reflection, self-regulation and self-monitoring aspects of metacognition. Kaufman (2016) emphasized that metacognition ensures a good creative performance and low metacognition may lead to lower creative performance.

When the teachers are capable of creative self-awareness and creative self-knowledge, then they can incorporate creative thinking into their classroom. Besides, it is important for a teacher to know herself/himself and make an objective evaluation and to be aware of how to improve himself/herself (Kaufman, 2016; Sternberg and Grigorenko, 2007). A teacher who is equipped with self-assessment and self-regulation skills and has the ability to use these skills (Reeve and Brown, 1985, Flavel, 1987) and creative skills effectively will significantly contribute to his/her active role in the learning environment (Kaufman, 2016; Kaufman and Beghetto, 2013).

The present study was limited to pre-service teachers' levels of metacognitive awareness and creative domains (scholarly, performance (art), everyday/self and artistic creativity).

Limitations and Recommendations

It is suggested to carry out further researches where creative domains and metacognitive skills are discussed with a larger sample group. Accordingly, other teaching fields and pre-service teacher candidates from different universities can be included to the sample group.

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