Cognitive and Trait Creativity in Relation with Academic Achievement

Mahnaz Kaboodi and Yeo Kee Jiar

***Abstract*—The focused objective of this work is to compare cognitive creativity with trait creativity in relationship with academic achievement. The development relating to creativity concerns the mental creativity as the influential factor in academic achievement while recent findings highlight the priority of personality creativity and emotional creativity in this link. This interpretation is based on the results of researches done in these areas of study. Despite the current attitude, mental dimension of creativity contributes to academic achievement as a more significant factor than its non- mental aspect. Concentration on trait and cognitive creativity affects educational system as the means for presenting and fostering creativity and innovation. Moreover, this trend influences the contemporary insight to creativity and its prerequisites not only in higher education but also in all levels of educational system.**

***Index Terms*—Academic achievement, cognitive creativity, higher education, and trait creativity**

I. Introduction

Every day, we face new changes in all aspects of life and creativity is not only a means for adapting with changes but also a stimulus for producing knowledge in different fields of study. Moreover, creativity as one of the key factors in success of life such as academic achievement [1] requires special attention. But the contradiction in the results of the researches pertaining to the more influential type of creativity in academic achievement necessitates researchers and experts to focus more accurately on cognitive and trait creativity and their impacts on academic achievement. The key purpose of this review study is to compare the results of ten researches with cognitive and trait views to creativity and their correlation with academic achievement. The results indicate cognitive creativity is so far more correlated with academic achievement than trait creativity.

According to the report of Egmont [2] from European University Association, creativity has attracted the attention of experts and responsibilities so that it has been concerned as their main policy in their planning. Thus significance of creativity prompted professionals in the area of psychology to view creativity from different perspectives.

Based on the literature review, five theories [3] and six main models [4] pertain to creativity have been presented. According to these different approaches, empirical and theoretical studies have been conducted to clarify the real nature of creativity concept. However, based on the objectives of studies, creativity have been highlighted in studies differently.

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Some specialists focus on creativity as mental capacity while other groups know it as a skill which is rooted in personality. Guilford [5] identifies creativity as cognitive procedures while Sternberg believes that creativity is combination of “intelligence”, mental methods, “personality” and “motivation”.

Therefore, the mental aspect of creativity points out to the capacity to recognize the problem and define it. In addition, in the definition of Boden, creativity refers to creating the new opinions that should be attractive and understandable. Moreover; Court knows creativity as human mental capacity which assists people to apply their thinking and originate opinions and resolution [6] Therefore in the first approach, mental nature of creativity has been focused .

The other insight to creativity highlights the different aspect of this concept. According to the declaration of San’chez- Ruiz *et al.* [7] creativity is the capacity consisting of divers effective factors such as personality traits, mental abilities, mental strategies. In addition, they believes that creativity is presented in social relationship however it is a personal issue. Moreover, they cite from Kim that the results of experimental studies have estimated just 20%-40% correlation between divergent thinking and intelligence quantity while the results of eleven reviewed studies confirmed the relationship between divergent thinking and creative personality as the main indicators of creativity. While cognitive capacities have the lowest affiliation with creativity.

Therefore, some professionals have viewed creativity from both mental and non- mental perspectives. For instance, Ivecevic *et al.* [8] cite from Ramos who identifies creativity as the cognitive procedures which can not be separated from the social situation on which a person takes action. Moreover; they believe creativity needs originality substitute options which are new and proper and creative individual should be able to answer questions divergently.

According to different attitudes to creativity, this concept has been defined diversely so that Runco [9] declares that there is not “standard definition” for creativity because different theories and approaches define it variously. The contradiction in the definition of creativity and the interpretation of people about this capacity has been confirmed by the results of empirical studies.

Based on the findings of the study that has been conducted by European University Association [2], students and staff of 232 institutions from 25 countries identified the main features of creativity as: "originality", "appropriateness", "future- orientation and problem solving ability. Originality points out to novelty and not reproducing ideas or objects. Appropriateness emphasize on the new attitudes to the current problem, because not all new issues

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are suitable. Future- orientation feature insists on thinking about future possible outcomes and not old possibilities. Furthermore, problem solving is the ability to view the affairs with new viewpoints, braveness to deal with it and preparedness for failing.

The lack of conformity in the opinions of experts to creativity has created contradiction not only in defining creativity but also different interpretation about the characteristics of creative people. Some psychologists believe that creativity is derived from common thinking procedures like usual problem solving. While, other groups like Feldman and Simonton state that "ordinary" people hardly create creative things but special individuals are creative in a particular professions like "music", "literature" or "science" [10].

In spite of the diversity in definition of creativity, some experts declare that novelty, originality, and "usefulness" and "adaptation" are the main elements of creativity [11].

Based on the different approaches to creativity, two key attitudes consisting of mental and personality insights are concentrated in this study. Therefore, creativity is viewed through the perspectives of Guilford and Five Personality Factors Models (FPFM).

According to J.P Guilford, cognitive creativity is the mental ability that assists people to think divergently and find the unusual solutions for solving problems [12].

On the other hand, the influence of personality characteristics on creativity has been highlighted by some experts such as Sanchez Ruiz *et al.* [7]. In general, personality has been defined as the way of "thinking", "feeling", and "acting" however there are different approaches to personality. For instance, according to Five Personality Factor Model, personality is consisted of five dimensions including: "Neuroticism", "Extraversion", "Openness to experience", "Agreeableness" and "Counscienciosness". The followers of this model believe that everybody is located between two extents of each of these dimensions [13].

However, some experts believe that both mental and personality factors particularly openness to experience are effective in creativity. For instance, according to the literature reviewed by Miller [14] combination of mental abilities and "openness to experience" indicate the creativity. This conclusion was on the basis of his empirical study that demonstrated that cognitive capacities and openness to experience are influential factors in presenting creativity in Asian and Western societies.

However, the priority of these factors as the indicators of creativity is a discussable subject that should be more concentrated by experts. For instance, the results of a study with the social insight to creativity demonstrated that emotions such as "anger", "pleasure", "boredom" and behavioral capacities like "communication skills" and "social network skills" are the prepositions of creative function [15]. While the other group professionals emphasize on mental aspect of creativity as the criteria for being creative.

Contradiction in the results of studies pertain to the real indicators of creativity and the role of creativity in prosperous of people prompt the researchers of this study to compare cognitive creativity and openness to experience in relation with academic achievement as a kind of success in life.

II. Method

The study of creativity has drawn the attention of professionals and researchers in a variety of disciplines as the concept that is considered to be of central importance in many contexts. There have been recent integrative efforts to describe and delineated the field of creativity research.

Concentrating on cognitive and trait creativity and their relationship with academic achievement, the results of ten researches are compared to recognize which kind of creativity is more influential in academic achievement. Five of these studies are based on cognitive view to creativity and the others emphasize on non-cognitive aspect of creativity.

In addition, in some researches the key criterion for creativity is personality because it is believed to be presented in communicational situations and in relation with others.

In such studies, personality is evaluated on the basis of five main elements consisting of "neuroticism", "extraversion", "openness to experience", "agreeableness", and "consciousness" [16]. Each of these factors indicates a set of characteristics. For instance, openness to experience is interpreted as the feature of creative people [14].

However, creativity has been highlighted as mental and non- mental capacity, its influential effects on other aspects of life such as academic achievement has been demonstrated. For instance, the results of the study conducted by Watkins [17] indicate that both personality traits and mental skills affect on academic achievement.

Therefore, in this review, openness to experience is studied as the indicator of trait creativity in relation with academic achievement. The purpose of this study is to signify which one of the indicators of creativity is more correlated with academic achievement.

III. Results

Based on table 1 in the following, the results demonstrate that cognitive creativity and trait creativity differentiate from the viewpoints of relation with academic achievement therefore; the outcomes of 10 researches are classified in two categories:

TABLE I: Correlation between Creativity and Academic Achievement

Creativity	Academic Achievement
Cognitive	0.54
	0.37
	0.36
	0.24
	0.10
Trait	0.49
	0.39
	0.24
	0.22
	0.21

A. Relationship between Cognitive Creativity and Academic Achievement

The most popular attitude to creativity is cognitive approach and this issue is concerned as the mental ability and procedures which creative person deal with to solve a problem.

Many researches pertaining to this domain of creativity confirm this relationship. For instance, Wang [1] studies American students to demonstrate the relation between cognitive creativity and academic achievement of this group of participants. The results show that these two variables are positively related to each other with the range of 0.37.

In addition, as it can be seen in the table, the results of the study on 272 undergraduate students done by Pishghadam *et al.* [18] demonstrate that there is relationship between cognitive creativity of participants and their academic achievement while estimated correlation is 0.36 which is interpreted as the high measurement of creativity.

Furthermore, on the study on a group of Taiwanese students, Wang [1] observes that cognitive creativity and academic achievement are positively related to each other with the measurement about 0.24.

Therefore, the relationship between cognitive creativity and academic achievement has been confirmed by the results of studies. However, in addition to mental creativity, personality creativity should be concentrated to clarify the more influential kind of creativity in academic achievement.

Interest to study the relationship between cognitive creativity and academic achievement has prompted some researchers to compare different groups based on these variables. For instance, Atkinson [19] studied 54 college students and 50 pupils. He intended to compare these two groups to signify whether the cognitive creativity and academic achievement are related or not. He concluded that there was 0.54 correlation between cognitive creativity and academic achievement of participants.

In the other expanded survey that was conducted by Khamse [20], 3344 female and male university students were studied. The results of this study demonstrate that total cognitive creativity has correlation with academic achievement. The value of this correlation is 0.10 and author defines this measure as the significant relationship.

The outcomes of these studies are in conformity with the findings of Ingham *et al*. [21] that indicate creative and non-creative engineer students differentiate from the viewpoints of learning styles which are working based on cognitive capacities.

In spite of the confirmatory results of studies pertains to the relationship between cognitive creativity on academic achievement, focusing on other form of creativity is required.

Based on the emphasis of experts on creativity as a multidimensional issue [22], concentrating on other aspects of creativity such as trait creativity can expand the knowledge of creativity. Particularly, the influence of trait creativity as the non- mental capacity on different tasks such as academic achievement should be highlighted in empirical studies.

B. Relationship between Trait creativity and Academic Achievement

Some experts like San'chez-Ruiz *et al.* [7] believe that creativity should be paid attention as the phenomenon consisting of mental and non-mental aspects while traits and "emotional factors" are the main component in presenting creativity. Therefore, they identify creativity as a multidimensional phenomenon with many influential factors consisting of personality characteristics, cognitive capacities, cognitive methods and "motivation.

In the study of personality, openness to experience has been identified as the main feature of creative individuals [14]. Therefore, some researchers have been encouraged to study the relationship between openness to experience as the key characteristics of creative people with other variables such as academic achievement.

The results of some empirical studies have confirmed this relationship. For instance, the following studies delight the relationship between trait creativity and academic achievement.

The results of some practical studies have demonstrated that there is relationship between personality characteristics and academic achievement [23]. However, this issue needs more accurate studies to clarify whether trait creativity is correlated with academic achievement or not.

Accoding to the study that is conducted by Farsides [24], he concludes that relationship between openness to experience with academic achievement of 432 graduated university students is 0.24 and he interprets this measurement as a suitable correlation.

Moreover, in the other study contributed to Diseth [25] the openness to experience in 315 undergraduate students is correlated with academic achievement while the correlation is 0.22.

In addition, based on the study of Komarraju and Karau [26] on 172 undergraduate students, openness to experience shows 0.21 correlation with academic achievement.

Concentrating on the relationship between trait creativity and academic achievement, Bickle [27] conducted two studies to signify the values of this relationship among college students.

On the first research, he studied 139 male and female college students to know whether there is relationship between their trait creativity and academic achievement or not. The results of this study demonstrate that there is 0.49 correlation between openness to experience and academic achievement.

Furthermore, in the other study that is contributed to Bickle, he studied 92 male and female college students and he demonstrated that there was 0.39 correlation between trait creativity and academic achievement. However, these results foster the idea of the relationship between trait creativity and academic achievement; the accurate studies are required to provide expanded knowledge in these areas of psychology and education.

IV. Discussion

In order to compare the role of cognitive creativity and trait creativity in relation with academic achievement, the results of 10 studies are focused. For this purpose, the final results of studies that indicate the value of correlation has been concerned. Therefore, estimated measurement of correlation between trait creativity and cognitive creativity

with academic achievement is the key criteria for comparing the findings of these studies.

As it can be seen in Figure 1, five of these studies have evaluated the relationship between cognitive creativity and academic achievement. While the five others have measured the relationship between trait creativity and academic achievement. The considerable point is that all these studies have been conducted separately. However, for the purpose of more comprehensible comparison, they have been categorized in five groups respectively.

According to the findings of studies that have been demonstrated in Figure 1, in three groups of these studies consisting of group 1, 3, and 4 cognitive creativity shows higher correlation with academic achievement than cognitive creativity.

On the other hand, in group 2 and 5, trait creativity demonstrate the higher relationship with academic achievement in comparison with cognitive creativity. These results are in conformity with the statements of Naderi *et al* [28] that believe on the contradiction in the findings of researches pertain to the priority of mental or non-mental aspects of creativity in relation with other variables such as academic achievement.

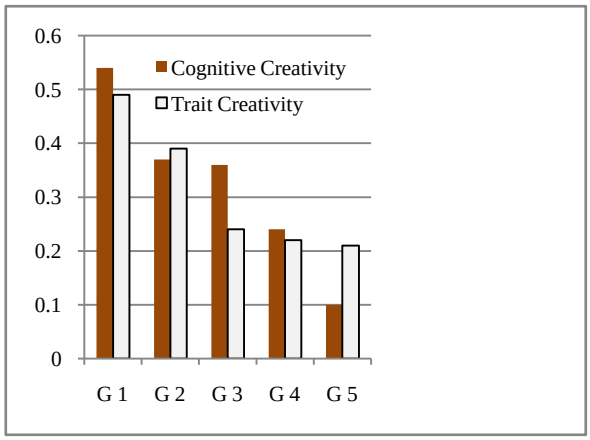

Fig. 1. Cognitive &Trait Creativity in Researches

The data in Graph1 show that cognitive creativity in comparison with trait creativity has the higher correlation with academic achievement. However, the researchers of this study prefer to have more accurate interpretation about the comparison between cognitive creativity and trait creativity.

For this purpose, estimating the mean of correlations can provide the more accurate and understandable means for comparing cognitive creativity with trait creativity in relation with academic achievement.

Based on Table 2, the mean of the correlations of researches which have studied the relationship between cognitive creativity and academic achievement is 0.32.

On the other hand, the mean of the correlations of studies that measure the relationship between trait creativity with academic achievement is 0.31.

By comparing the means of these values of correlation, it can be concluded that the mean of correlation of studies with concentration on cognitive creativity is a little higher than the mean of the other group with trait approach to creativity.

TABLE II: MEANS OF CORRELATION BETWEEN CREATIVITY AND ACADEMIC ACHIEVEMENT

Creativity	Academic Achievement
Cognitive	0.54
	0.37
	0.36
	0.24
	0.10
Mean	0.32
Trait	0.49
	0.39
	0.24
	0.22
	0.21
Mean	0.31

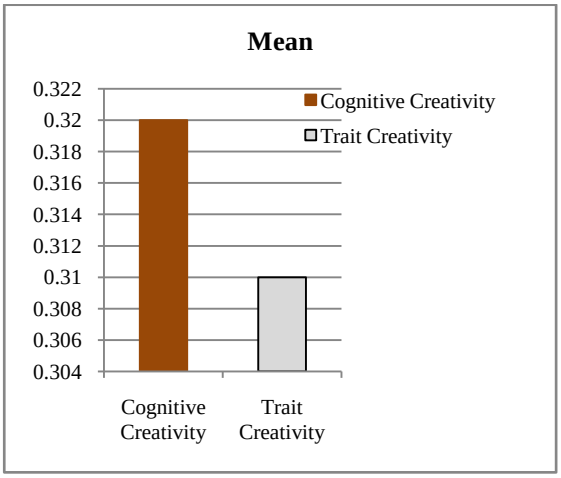

Fig. 2. Means of Cognitive &Trait Creativity in Researches

This result can be recognized from figure 2 that shows the mean of correlation between cognitive creativity and academic achievement in these studies is higher than the mean of correlation of trait creativity with academic achievement. However, the difference between the values of means is not so considerable; the cognitive creativity has been identified as the more correlated factor with academic achievement. These results can convey the importance of mental process of creativity and its influence on educational success. However, defining cognitive creativity as the more influential factor in academic achievement should be based on expanded studies and interpreting this result on the basis of just the results of ten researches is not enough.

V. CONCLUSION

Based on the results of studies pertain to the importance of creativity on academic achievement, concentrating on different aspect of creativity seems crucial issue. Cognitive creativity as the more considered aspect of creativity in studies has been interpreted as the powerful indicator of creativity. However, other aspects of creativity consisting of mental, social, emotional and personality dimensions need more accurate studies.

The contradiction in the results of studies relating to creativity, its different aspects, and its influences on

academic achievement, is a big gap that is recognizable in psychological and educational area of studies.

Therefore, future researches are recommended to have expanded studies relating the different aspects of creativity to expand scientific and logical view to this issue and promote the knowledge of this concept and pertaining factors.

This trend can influence crucial benchmarks for training creative people because there is not conformity in the opinions of experts about the characteristics of creative people.

In addition, the required backgrounds for being successful in academic task and activities may change. Moreover, this subject can affect the educational system and instructional plan and methods in all levels of educational system particularly higher education.

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