Original Research

The Predictive Ability of Emotional Creativity in Creative Performance Among University Students

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Abstract
This study investigated the predictive ability of emotional creativity (EC) in creative performance (CP). The sample consisted of 297 male and female students from literary, educational, and administrative specializations. EC was assessed by Averill’s Emotional Creativity Inventory that includes three dimensions: preparedness, novelty, and effectiveness. Mednick’s Remote Associates Test was used to assess CP. Results revealed that the three dimensions of EC predicted CP. Statistically significant differences in EC were found in favor of female students and students from literary and educational specializations, whereas no significant differences were found by cumulative grade. Nevertheless, statistically significant differences in CP by cumulative grade were found in favor of students with high grades. No statistically significant differences in CP by gender and specialization were found. It was recommended based on the results that the three dimensions of EC be integrated in programs seeking to enhance students’ creative thinking skills.

Keywords
creativity, emotion, Remote Associates Test, creative performance

Introduction
Psychologists have studied creativity from different perspectives. Guilford (1967) focused on divergent thinking that enables the individual to find novel solutions to problems and to generate varied unfamiliar ideas. Torrance (1974) argued that creativity represents a successful step in the unknown, openness to experiences, and realization of new relations. Creativity in Torrance’s perspective is a response that shapes new structures rather than adapts with them. Sternberg and Lubart (1999) defined creativity as an individual’s ability to generate something new and useful. Mednick (1962) viewed creativity in a different way. He held that it is shaping associative elements in new combinations that meet given requirements or serve a given purpose. Thus, creativity needs convergent thinking to reach a specific creative solution. Therefore, Mednick’s view came unlike Guilford, who focused on divergent thinking.

Creativity Between Divergent and Convergent Thinking
There has been a controversy as to the issue of divergent thinking and convergent thinking in the creative process with researchers holding one of two extensive views. The first view is based on the work of Guilford and Torrance, who held that real creativity stems from divergent thinking (i.e., thinking that goes in multiple directions). Guilford (1967) presented the alternate uses task, where simple stimuli such as a pen are provided and respondents are to generate as many uses of the intended stimulus as they can. Creativity is then evaluated by the number of responses (fluency), categories used (flexibility), the degree to which responses are different from those given by the group (originality), and the number of additions (elaboration). Guilford (1967) held that convergent thinking does not produce creative solutions, as it relies on speed, logic, accuracy, and recall, and that it restricts the mind by searching for given solutions without a possibility of dealing with ambiguity to generate the new ideas. The
second view, however, proposes that convergent thinking (i.e., thinking in a specific direction that leads to one solution) is an integral component in creativity. This view is reflected in Wallas’ stages of creativity, Osborn’s brainstorming, creative problem solving, and Mednick’s test of creativity (Cropley, 2006; Lubart, 2016).

Convergent thinking proponents hold that creativity is not limited to divergent thinking. Mednick (1962) suggested that divergent thinking leads to the generation of many ideas, whereas convergent thinking facilitates the evaluation and choice of generated ideas. Convergent thinking includes making decisions about standards, restrictions, and opportunities available from variation. In this respect, Runco (2014) argued that divergent thinking is not equivalent to creative thinking. Rather, it stimulates cognitive processes that sometimes result in finding original ideas and solutions. For this reason, researchers have extensively used divergent thinking tests to assess creative thinking. However, creativity is not limited to divergent thinking in the psychological literature, as convergent thinking also plays a useful role in creativity. This role is evident in Mednick’s associative theory of creativity that focuses on how the two processes of generating and changing ideas occur simultaneously. Brophy (1998) suggests that divergent and convergent thinking alternate during creative problem solving (CPS). Cropley (2006) asserts that divergent thinking results in generating new solutions, whereas convergent thinking evaluates these solutions, allows for effectiveness and novelty, and provides paths for these solutions. Thus, creativity should not be conceived of as being only based on divergent thinking that may produce false and rash creativity if it is not adapted to reality.

The need for convergent thinking in creativity is evident from the close relevance between knowledge and creativity, as knowledge is basic to creativity. This relevance emerges in the preparation stage that entails comprehensive and deep knowledge background about the topic of creativity. It also emerges in the verification stage where the idea is tested to reach the creative product that achieves the social satisfaction (Wallas, 1926). What also stresses the role of knowledge in creativity is that individuals with limited knowledge about a topic cannot combine ideas that are relevant to that topic or make unexpected associations of the parts of knowledge that they originally do not possess (Lubart, 2016). Experimental evidence did not support an individual’s ability to make creative achievements unless they possess relevant knowledge and skills in a long stage of preparation (Ericsson & Lehmann, 1996). Bailin (1988) managed to prove that many of Addison’s inventions were just modifications of existing ideas, for example, obtaining more than 100 patents for the electric lamp. Sternberg’s (1999) view refers to convergent thinking signs by stressing the importance of relying on previous knowledge to push the creative process ahead. These signs include using a familiar idea in a new context, looking at the familiar idea in a novel way, expanding knowledge, or reviving knowledge that was previously abandoned.

Like divergent thinking, convergent thinking is an integral part of the creative process. It clearly emerges in brainstorming and creative problem-solving models that require being sensitive to the problem, identifying it and collecting data about it, generating ideas, verifying solutions, selecting the best solution, testing it, and accepting it (Isaksen & Treffinger, 1985; Osborn, 1963; Parnes, 1967). Creative solutions in the creative problem-solving model are based on changing what actually exists by improving quantity or quality, addressing limitations, reducing costs, using the system in novel ways, generating a new compound from existing elements, or generating novel and original solutions (Savransky, 2000). Convergent thinking (CT) emerges in the entire previously mentioned CPS steps except for generation of ideas. Even though the two main views of creativity have logical evidence, researchers limit themselves to any of them. The reason for this is that extensively used tests of creativity are based on either divergent (e.g., Guilford’s and Torrance’s tests) or convergent (e.g., Mednick’s test) thinking. The present study used Mednick’s test because the other variable, emotional creativity (EC), is not limited to generating novel creative emotions, but it also extends to adapting emotions to what is socially acceptable or unacceptable. It therefore requires addressing and improving novel emotions, which make it more aligned with convergent thinking.

### Creative Performance (CP) in Mednick’s Perspective

Mednick (1962) conceived creativity from the divergent thinking perspective. He used convergent thinking to reach creativity and defined creativity as putting associative elements in new combinations that either meet given requirements or achieve some benefit in one way or another. The more the new elements are remote from existing information, the more creative the process or solution is. In his associative theory, Mednick assumed the existence of what he termed associative hierarchies, so that creativity means using associative elements to find new combinations. In these new combinations, creative individuals display a higher ability to reach the reciprocal elements between remote associations and then integrate them to form creative solutions. Mednick suggested that creative solutions to problems could be achieved through the three processes of serendipity, similarity, or mediation. In serendipity, the required creative solution can be achieved through the contiguous environmental appearance of stimuli that elicit these associative elements, for example, the discovery of penicillin. In similarity, creative solutions can be reached through the similarity of the associative elements or the similarity of the stimuli eliciting these associative elements. This process is evident in poetry, sculpture, and music composition. Finally, in mediation, creative solutions can be achieved through the mediation of common elements that make the associative elements in
contiguity. This process is practiced in areas that require the use of symbols, for example, mathematics and chemistry.

Mednick developed the Remote Associates Test (RAT) that is extensively used in psychological research to assess creativity. The reason for the popularity of the test is that it (a) is quite reliable and valid as revealed in many studies and (b) correlates significantly with other creativity tests such as Torrance’s test (Chermahini et al., 2012). Each question on the RAT consists of common stimulus words that appear to be unrelated. The person being tested must think of a fourth word that is somehow related to each of the three words. In answering the test questions, creative thinking is required to find more than one solution until the right one is found, as the first and most obvious solution is often not correct (Mednick, 1962).

**CP With Gender and Academic Aspects**

Several studies explored the relationship between creativity and the variables of gender, age, and cultural differences. Piffer (2011) reported that gender and acceptability predicted CP among university students in Italy. CP predicted creative scientific achievement, but did not predict artistic CP. High achievers were more creative than low achievers in Indian schools as reported in the study by Gautam (2012). The study also found a statistically significant negative correlation between CP and anxiety. Okereke and Ugwuegbulam (2014) did not find gender differences in overall CP among university students. Furnham (2016) reported a positive correlation between cognitive ability and creativity, and a negative correlation between cognitive ability and emotional intelligence. No significant correlation was found between gender and CPS. Gajda et al. (2017) reported a positive constant correlation between achievement and creativity. Verbal tests of creativity had significantly stronger correlations compared with formative tests of creativity. It is therefore clear that findings are inconsistent concerning the effects of gender, achievement, and specialization on EC and CP.

In the Arabic environment, Barakat (2011) found significant differences in (a) performance on the RAT by specialization in favor of students studying science in secondary school and (b) grades in favor of high achievers. Meanwhile, no significant differences in performance on the test were found by grade level and gender. Arab and Alayed (2012) found that female students in Al-Majmaah University had a generally high creative ability than did male students, whereas students did not differ in the creative ability due to their different specializations. Saha (2012) found a positive correlation between the socioeconomic status and CP of adult students in India, whereas no significant differences were found between males and females in CP. Al-Zghoul and Al-Dababi (2014) did not find significant differences in creativity due to gender and specialization among university students in Jordan.

**EC**

Runco (2014) contends that creativity falls on the line separating cognition and emotion, as the creative process may vary from one emotion to another, and emotions themselves can be creative products. Cognitive creativity not only results from perception and cognitive processes but also depends on noncognitive and emotional processes such as attitudes, interests, and stimulation. Emotion is crucial to creativity. It stimulates creativity and arouses interest in it, and gives value to ideas in addition to information. Creative self-efficacy is another important link between emotions and creativity, as it shapes one’s beliefs about their ability to empower their creative skills to reach novel and valuable creations. However, emotions interact with perceptions and act as motives that trigger CP (Alzoubi, 2014). Furthermore, Alzoubi et al. (2016) found that training on creative thinking promotes creative self-efficacy in university students. This indicates that creative self-efficacy as an emotion component plays a part in creativity.

Mourgues et al. (2015) concluded that differences in creativity are not attributable to the development of experiences or interests; rather, they can emerge as a result of the strong effects of social characteristics such as adjustment and emotional self-awareness. This is an indicator of the strong effect of emotion on creativity. Fredrickson (2001) paired emotion with creativity through her theory contending that positive feelings stimulate the individual to generate ideas and perform varied tasks, which increases one’s interests and CP. Chan (2006) concluded that the relationship between creativity and happiness is reciprocal, in that, they promote each other. People think creatively when they are happy and satisfied with their work. Thus, the proposition that creative people are prone to suicide and madness should be corrected.

EC includes three levels graded from simple to complex. The first level relates to the effective implementation of one’s emotions. The second encompasses modifying one’s emotions according to the requirements of the situation. The third level involves developing a novel form of emotions, that is, changing one’s emotions and the rules shaping them (Averill, 1999). The emotional creative response begins with a process known as preparedness that shapes the logic preceding EC and represents one’s inclination to understand and learn from own and other’s emotions (Averill & Thomas-Knowles, 1991). The emotional creative response is subject to three interacting criteria: novelty, effectiveness, and originality. Novelty means responding in a way that differs from what one is used to in everyday life, for example, treating an intimate friend in a novel way that promotes friendship with him or her (Averill, 1999). Effectiveness refers to the benefit that one and others get from emotional response. Benefit varies based on the individual, the others, and their cultural and social norms. Thus, response effectiveness is usually subject to evaluation and reevaluation. For example, many creations were rejected and even ridiculed in the time they emerged.
Individuals learn throughout their lives how to express their emotions in accordance with society (Averill & Nunley, 1992). They come to a creative idea to accept the new emotions that are in preparation for the future, and interaction with it (Averill, 2004). Applications of EC can go further than the individual, as many of the problems that societies face today require changes in the way individuals respond emotionally. However, EC can threaten societies’ basic values, which generates resistance from societies (Averill, 2000). This can result from changing the emotion system and creating a new one that contradicts emotion systems that the society adopts. For this reason, dominant social and cultural values do not tolerate emotional responses that deviate a lot from the accepted rules (Averill et al., 2001). EC includes the effective expression of a given emotion derived from culture and the modification of a given emotion to better meet the needs of the individual or the group. It also includes, at its highest levels, the development of a new identity of emotions that urges the individual to change his or her beliefs (Runco, 2012).

EC plays an important role in the various activities of an individual, whether at the personal, social, cognitive, or mental level. This is supported by many relevant studies whose results indicated that EC enhances university students’ ability to use appropriate coping techniques (Averill, 1999; Barakat, 2016). In Gutbezahl and Averill’s (1996) study, university students with high EC wrote stories that expressed their true suffering in love; besides, their drawings were more expressive in terms of shape and area than were the drawings of students with low EC. Wang and Huang (2015) found that EC predicted the CP of Chinese workers. They also found that intrinsic motivation mediated the relationship between EC and CP. Emotional self-efficacy mediated the relationship between EC and creativity among university students in Turkey (Gurbuz et al., 2016). Contrary to these findings, Ivcevic et al. (2007) found no significant relationship between EC and CP. Emotional self-efficacy mediates the relationship between CP and EC, except for the novelty dimension. Furthermore, no significant relationship was found between performance on the Scholastic Aptitude Test (SAT), EC, and CP. A significant positive correlation was detected between EC and creativity appreciation and participation in the creative activity of poetry writing. The study concluded that EC correlates with cognitive creativity more than cognitive intelligence, whereas emotional intelligence correlates with cognitive intelligence more than with cognitive creativity.

**EC, Gender, and Academic Aspects**

Averill (1999) found that females outperformed males in EC. Similarly, Alabedi (2017) reported substantial gender differences in EC among university students in favor of females. The teaching experience enhanced the EC of in-service teachers in India (Gaurav & Girijesh, 2010). Wang and Huang
(2015) found no significant relationship between gender and age on one hand, and EC, and CP on the other hand. Cheung et al. (2003) reported that (a) creativity decreases with progression in university study in China and (b) students of humanities and social sciences outperformed business administration students in verbal creativity, in contrast with creative trials, in which business administration students were better. Charyton and Snelbecker (2007) reported better performance in music and general creativity in favor of students studying music in comparison with engineering students. Meanwhile, no significant differences on creative measures were found between the two groups of students by gender and age. Furthermore, Trnka et al. (2016) found positive correlational relationships between university students’ EC and creative recreational activities such as writing, painting, composing music, and acting; they also reported higher EC in students studying arts and humanities compared with students studying natural sciences, economy, and technology.

In the Arabic environment, Alzoubi (2019) found a positive relationship between EC and overexcitabilities: mental, sensory, imaginative, and emotional among university students in Jordan. Al-Shammari and Mazahem (2019) also found a positive correlation between EC and decision-making skills of university students in Iraq. However, many Arab studies found that females were more in EC than males (Al-Shammari & Mazahem, 2019; Alzoubi, 2019; Saed, 2008), whereas other studies have revealed that there is no significant statistical differences in EC due to gender and specialization among university students (Saleh, 2007; Zedan & Omar, 2014).

Based on what was mentioned above, it is clear that EC is as important as cognitive creativity for university students. They need to know how to respond emotionally to new situations that require unfamiliar emotional expression. However, families and educational institutions place all emphasis on cognitive creativity to the neglect of EC (although they cannot reach to these objects in reality). This can explain why these institutions fail to produce creative students. Al-Balqa Applied University seeks to achieve its mission through the application of knowledge in the various scientific specializations. However, the application of knowledge requires CP and emotions on the part of students who can differ socially, emotionally, and sometimes culturally, even though they live in the same country. Students should have more new interactions than the environments where they come from (e.g., nomadic areas, villages, and camps). The environmental context of Al-Balqa Applied University is different from other Jordanian universities, in that, it has more females than males for there are colleges allocated only for girls. Therefore, this study addresses these research questions:

**Research Question 1:** Can EC predict CP among university students?

**Research Question 2:** Are there differences in EC among university students by gender, specialization, and cumulative grade?

**Research Question 3:** Are there differences in CP among university students by gender, specialization, and cumulative grade?

The study aimed to explore the relationship between Jordanian university students’ EC and CP. It also explored the differences among students in EC and CP based on their gender, academic majors, and cumulative grade.

**Method**

**Participants**

Participants were recruited during the summer semester of the academic year 2016–2017 from two colleges at Al-Balqa Applied University: Princess Alia College, for literary and educational specializations, and Amman College, for administrative specializations (total population had 2,119 male and female students). Stratified sampling was used to select the study sample from the target population. Accordingly, three departments were randomly selected from literary (English language) and educational (child education, psychological counseling, and special education) specializations from Princess Alia College, and administrative (business administration and accounting) specializations from Amman College. The two literary and educational specializations from Princess Alia College have only female students. Administrative specializations have male and female students. A total of 297 students were participants in this study (75 males = 25% and 222 females = 75%). It should be mentioned here that the number of females was much bigger than that of males, because this reflects the real proportion of both sexes in the target populations, where there were entire colleges for females. The participants’ ages ranged between 18 and 23 years ($M = 20.3$ years for males, $M = 21.1$ years for females). The study sample is described according to its variables (see Table 1).

| Gender | Specialization | Grade |
|--------|---------------|-------|
| Males  | Females       | Literary | Educational | Business administration | Very good and above | Good | Acceptable and lower | Total |
| 75     | 222           | 88     | 111         | 98             | 77               | 148  | 72                    | 297   |

**Table 1. The Distribution of the Study Sample According to Gender, Specialization, and Cumulative Grade.**
Instruments

The Emotional Creativity Inventory (ECI). The ECI that Averill (1999) developed based on the social learning theory was used in the present study. The original inventory consists of 30 items that measure three dimensions: preparedness (seven items), novelty (14 items), and effectiveness/originality (nine items). Students respond to items according to a 5-point Likert-type scale ranging from 5 (strongly agree) to 1 (strongly disagree). Negatively worded items (four out of 30) are reverse coded.

Averill (1999) established the validity of the inventory by factor analysis after piloting it on samples from different countries, for example, the United States, Europe, and Asia. It was also administered in the Arabic environment in several studies using translated versions. That procedure yielded three factors. He also established its reliability by the test–retest method and the Cronbach’s alpha method. The test–retest method rendered a reliability coefficient of .91. Reliability coefficients for the three dimensions were .82 (preparedness), .84 (novelty), and .83 (effectiveness/originality). The reliability of the ECI was also established in other studies conducted in the Arabic environment. Those studies used larger samples than the sample of the present study and reported comparable reliability coefficients. For instance, Alabedi (2017) established the inventory’s external and internal reliabilities. The inventory proved to have high reliability coefficients. The inventory yielded an overall reliability coefficient of .82 by the test–retest method and .83 by Cronbach’s alpha.

In the present study, the validity of the ECI was established by presenting it to a jury of 10 specialists in educational psychology, and for measurement and evaluation at Al-Balqa Applied University to judge the appropriateness of the inventory to the participants, the accuracy of the Arabic translation, and the extent to which the dimensions represented EC. An agreement ratio of 7/10 was set as a criterion to accept the item; all items received the required agreement ratios. Furthermore, some rewording of the items was performed based on the judges’ recommendations.

The inventory was also administered to a pilot sample of 44 male and female university students. Internal consistency was then established by computing correlations between items, and dimensions and a total score. The correlation coefficients between items and dimensions ranged from .396 to .648. Correlations between items and a total score ranged from .316 to .721. All these values indicate that the inventory had high construct validity and could, therefore, meet the purposes of the present study.

In the present study, the reliability of the inventory was established by the test–retest method. The interval between the two applications of the inventory on the pilot sample was 2 weeks. The test–retest reliability coefficients for preparedness, novelty, and effectiveness were .79, .85, and .80, respectively. The counterpart reliability coefficients for the three dimensions as computed by Cronbach’s alpha were .82, .90, and .82.

The RAT. The RAT developed by Mednick (1962), and adapted to the Arabic environment by Barakat (2011), was used in the present study. It consists of 34 items measuring creativity by associating the test stimuli (words) to generate a novel unfamiliar response. Each item provides three stimulus words that are remote from one another. The respondent is required to find (via the creative process) another word that can be associated with them all in a meaningful way. Stimuli words can be associated with the solution word in a number of ways: by means of synonymy, formation of a compound, and semantic association. The respondent can provide more than one answer for one item. An example item is iron/electricity/key to which the answer is house. The test is scored according to an answer key, so there is one correct answer for each item. Thus, the respondent either gets one for a correct answer or zero for an incorrect answer. Hence, test scores range between 0 and 34.

Mednick (1962) established the test reliability by piloting it on a sample of university students and computing the Spearman–Brown correlation coefficient, which yielded a coefficient of .92. Barakat (2011) administered the test to a sample consisting of 473 Palestinian male and female students and omitted six items because they were not appropriate for the Arabic environment. Barakat then established test reliability by the test–retest and split-half methods that yielded reliability coefficients of .71 and .81, respectively.

In the present study, the test was administered to a pilot sample of 44 male and female students and then internal consistency was computed. Correlation coefficients between items and a total score ranged between .44 and .82, all significant at the .05 level. This meant that the test had high indicators of validity, that is, it could be confidently used in the present study. As to reliability, the split-half method was used. This method yielded a reliability coefficient of .83.

Results

To answer the first research question, Pearson’s correlation coefficients between participants’ scores on the ECI with its three dimensions (preparedness, novelty, and originality/effectiveness) and their scores on the RAT were calculated (see Table 2).

Table 2 reveals strong positive correlations among dimensions of EC and CP. The preparedness dimension ($r = .54, p < .01$) achieved the strongest correlation coefficients, followed by novelty ($r = .52, p < .01$) and originality/effectiveness ($r = .46, p < .01$). The correlational relationship between a total score of EC and CP was $r = .59, p < .01$.

To determine whether the three dimensions of EC can predict CP, multiple linear regression analyses were conducted (see Table 3).
Data in Table 3 indicate that dimensions of EC can predict CP. To identify the ability of EC dimensions (preparedness, novelty, and originality/effectiveness) to predict CP, multiple regression coefficients were computed (see Table 4).

Data in Table 4 reveal that the regression coefficient for preparedness (1.557, \( t = 3.072, p = .00 < .01 \)) was the most influential in predicting CP, followed by originality/effectiveness (1.485, \( t = 3.661, p = .00 < .01 \)) and novelty (1.396, \( t = 2.938, p = .004 < .01 \)). Beta scores were .242, .218, and .217, respectively. Based on these results, the multiple regression equation for the prediction of CP by EC dimensions can be formulated as follows:

\[
CP = 1.112 + 1.557 + 1.485.
\]

To determine the predictive ability of a total score of EC, analysis of simple regression was performed (see Table 5). Based on data in Table 5, the correlation coefficient between a total score of EC and CP was .59. The \( R^2 \) of the
correlation coefficient and modified explained variance was .347 and .34, respectively. Beta score was 4.439. This indicated that EC explained 34% of CP.

To answer the second research question, means and standard deviations of participants’ scores on the ECI were computed (see Table 6).

Data in Table 6 indicate differences in participants’ means of EC by gender, specialization, and cumulative grade. Female’s means were higher than males’. Participants studying arts had the highest means, followed by participants studying education and administration. Means of participants with “very good and higher” grades were the highest, followed by participants with “good” grades, and participants with “acceptable and lower” grades. The total EC statistics ($M = 3.63, SD = 0.59$).

To identify the significance of differences in means, 3-way analysis of variance (ANOVA) was performed after testing for homogeneity by Levene’s test ($F = 1.508, p = .101 > .05$), these results are shown in Table 7.

Data in Table 7 reveal that there were statistically significant differences in EC by gender, $F(1, 281) = 16.441, p = .000 < .01$, effect size ($\eta^2 = .055$), in favor of females. Similarly, there were statistically significant differences in EC by specialization, $F(2, 281) = 7.127, p = .001 < .05, \eta^2 = .048$, in favor of arts and education students. Conversely, there were no statistically significant differences in EC cumulative grade, $F(2, 281) = 0.842, p = .432 > .05$, or in EC by the interaction between gender, specialization, and cumulative grade, $F(10, 281) = 0.874, p = .558 > .05$.

To answer the third question, means and standard deviations of participants’ scores on the RAT were computed (see Table 8).

Table 8 shows that there were differences between participants’ means on CP. Differences were slight for gender and specialization, but for grade, they were more evident. Means of participants with “very good and higher” and “good” were higher than those with “acceptable and lower” grades. The total mean was 3.63 with a standard deviation of 0.59. To determine where these differences lay, three-way ANOVA was performed after applying Levene’s test of homogeneity ($F = 1.311, p = .144 > .05$), yielding the results listed in Table 9.

Based on data in Table 9, there were no statistically significant differences in CP by gender, $F(1, 281) = 0.271, p = .603 > .05$, or in CP by specialization, $F(2, 281) = 2.350, p = .097 > .05$. Yet, there were statistically significant differences in CP by cumulative grade, $F(2, 281) = 6.391, p = .002 < .05, \eta^2 = .044$, in favor of students with “very good and higher” and “good” grades. Finally, there were no statistically significant differences in CP by the interaction between gender, specialization, and cumulative grade, $F(10, 281) = 0.865, p = .567 > .05$.

**Discussion**

Results concerning the first research question indicated that the predictive ability of a total score of EC in CP was 0.347, which is more than one third the explained variance. This

**Table 6.** Means and Standard Deviations of Emotional Creativity and the Total Score by Gender, Specialization, and Cumulative Grade.

| Variable          | Level                | N  | M     | SD  |
|-------------------|----------------------|----|-------|-----|
| Gender            | Males                | 75 | 3.21  | 0.63|
|                   | Females              | 222| 3.77  | 0.51|
| Specialization    | Arts                 | 88 | 3.83  | 0.49|
|                   | Education            | 111| 3.76  | 0.44|
|                   | Administration       | 98 | 3.30  | 0.69|
| Cumulative grade  | Acceptable and lower | 72 | 3.54  | 0.69|
|                   | Good                 | 148| 3.63  | 0.53|
|                   | Very good and higher | 77 | 3.71  | 0.60|
| Total             |                      | 297| 3.63  | 0.59|

**Table 7.** Three-Way ANOVA of the Effect of Gender, Specialization, and Cumulative Grade on Emotional Creativity.

| Source            | Sum squares | df | M squares | F value | Sig. | Partial eta squared |
|-------------------|-------------|----|-----------|---------|------|-----------------|
| Gender            | 4.570       | 1  | 4.570     | 16.441  | .000** | .055            |
| Specialization    | 3.962       | 2  | 1.981     | 7.127   | .001** | .048            |
| Cumulative grade  | 0.468       | 2  | 0.234     | .842    | .432  | .006            |
| Interaction       | 2.431       | 10 | 0.243     | .874    | .558  | .030            |
| Error             | 78.110      | 281| 0.278     |         |       |                 |
| Total             | 103.552     | 296|          |         |       |                 |

Note. ANOVA = analysis of variance.

**Significant at $p < .01$.**
finding concurs with Averill’s theory, in that, preparedness is the first component of EC (Averill, 1999). Preparation is also the first of creativity stages in the creative process model (Wallas, 1926). Both novelty and originality/effectiveness are criteria for judging creativity in general as suggested by Averill (1999). Such components, whether cognitive or emotional, are essential to creativity. They can urge the individual to perform creatively, as they can activate one’s prior and subsequent positive emotional experiences. They, therefore, effectively stimulate one to perform creatively in a way that is beneficial to the individual and other people. Taking into account the differences in interests between emotional and cognitive creativity, it seems obvious that EC is concerned with the individual’s personal emotional content, whereas cognitive creativity is concerned with mental efforts and cognitive processes that contribute to the finding of the creative product. However, cognitive creativity entails the emotional investment of such efforts and operation in the personal context that requires cooperation and participation (Fuchs et al., 2007). This indicates that emotions should be exploited for creativity. Positive emotions can motivate an individual to realize his or her aim and persist to develop valued creative products. Negative emotions, however, can lead one to depression and deter expression of one’s creative potentials. CP requires positive emotional thrusts, so individuals can perform with enthusiasm and tolerance of ambiguity until they reach the suitable creative solutions. In this respect, Fredrickson (2001) suggested that positive emotions could widen individuals’ scope of perception and allow for their generating multiple meanings, views, and solutions that enhance their ability to produce novel ideas. Emotional preparedness was the strongest factor explaining CP. This could be due to the strong connection of emotional preparedness to situations and mental expectations that anticipate the scenario of the situation before it occurs based on previous experiences and intuition.

As to novelty, it is a common component in EC and general creativity. Novel responses, whether emotional or cognitive, can originate from similar beginnings as a result of the similarity in goals and regardless of the difference in content. Mental processes can operate according to similar mechanisms when the production of novel ideas or emotions is required. This is because novel production provides the individual with new value and information. Novelty can also stem from one’s internal motivation (Smith et al., 2017).

As to the relationship between originality/effectiveness and CP, effectiveness, that is, the benefits resulting from the creative process or the creative product, can originate from external stimuli in the social environment. This not only results in personal satisfaction but it also leads to social satisfaction and acceptance of the creative product. In this respect, Smith et al. (2017) assert that positive social motivation helps with the finding of novel ideas, and that individuals with positive internal and social motivation are more likely to produce many creative ideas. Creativity lies in the line separating cognition and emotion. Emotion is very important for creativity, as it stimulates creative endeavors.

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**Table 8.** Means and Standard Deviations for Creative Performance by Gender, Specialization, and Cumulative Grade.

| Variable          | Level                  | N  | M    | SD  |
|-------------------|------------------------|----|------|-----|
| Gender            | Males                  | 75 | 16.57| 4.83|
|                   | Females                | 222| 17.47| 4.31|
| Specialization    | Arts                   | 88 | 18.02| 4.04|
|                   | Education              | 111| 17.57| 4.27|
|                   | Administration         | 98 | 16.18| 4.86|
| Cumulative grade  | Acceptable and lower   | 72 | 15.32| 5.00|
|                   | Good                   | 148| 17.93| 4.12|
|                   | Very good and higher   | 77 | 17.73| 4.08|
| Total             |                        | 297| 17.25| 4.46|

**Table 9.** Three-Way ANOVA of the Effect of Gender, Specialization, and Cumulative Grade on Creative Performance.

| Source            | Sum squares | df | M squares | F value | Sig. | Partial eta squared |
|-------------------|-------------|----|-----------|---------|------|---------------------|
| Gender            | 5.025       | 1  | 5.025     | 0.271   | .603 | .001                |
| Specialization    | 87.156      | 2  | 43.578    | 2.350   | .097 | .016                |
| Cumulative grade  | 237.025     | 2  | 118.513   | 6.391   | .002*| .044                |
| Interaction       | 160.344     | 10 | 16.034    | .865    | .567 | .030                |
| Error             | 5,210.417   | 281| 18.542    |         |      |                     |
| Total             | 5,887.057   | 296|          |         |      |                     |

*Significant at p < .01.
and arouses interest in them (Runco, 2012). This finding also concurs with the studies that found significant positive relationships between EC and CP (Sorour & El-Menshawy, 2010; Wang & Huang, 2015). This finding is nevertheless inconsistent with a study by Ivcevic et al. (2007) that found no correlation between CP and the dimensions of EC except for novelty.

Results revealed statistically significant differences in EC by gender in favor of females. This finding seems logical, as females in our society are known to consider emotional affairs more than males. This could be due to socialization and cultural traditions that encourage females to express their emotions, contrary to males who are encouraged to suppress and hide their emotions. Thus, unlike males, females use their creative abilities in emotional affairs. Furthermore, females are more inclined to think about and rehearse their emotions so they become more effective and original. Several studies reported gender differences in emotions in favor of female students (Al-Shammari & Mazahem, 2019; Alzoubi, 2019; Saed, 2008). Hall and Matsumoto (2004) found that females are more accurate than males in emotional judgments. Collignonab et al. (2010) reported strong gender differences in favor of females in multisensory perception for expressing feelings. Females were also found to have higher EC than males (Averill, 1999). Gender differences in EC can be attributed to biological factors as well as socialization, even though results concerning these factors are not consistent. For example, Kret and De Gelder (2012) found that the same brain parts in females and males process social information differently, so that females were better in recognizing emotions and expressing themselves than males who responded more to threatening stimuli. Meanwhile, the present study’s finding concerning gender differences is not in line with studies that found no gender differences in EC (Saleh, 2007; Wang & Huang, 2015; Zedan & Omar, 2014).

Results also revealed statistically significant differences in EC by specialization in favor of students studying arts and education. This finding may be attributed to the nature of the study of arts where emotions are emphasized as in poetry, fiction, and other literary genres. Gutbezahl and Averill (1996) found that EC enhances creative expression in fiction and drawing. Educational specializations also place considerable emphasis on the expression of emotions, creative thinking skills, and psychological and social well-being. Administration studies, however, place little, if any, emphasis at all on emotions. Creativity is not limited to specific fields of study. However, the focus in fields such as technology and economy may be placed on other aspects rather than creativity. They focus mostly on realistic and strict rules to the neglect of emotional aspects. Arts, poetry, and music, however, focus on displaying and practicing creative emotions. Trnka et al. (2016) found that arts students are warmer and more sensitive than are students of other majors. Ivcevic et al. (2007) reported a positive relationship between appreciation of creativity and participation in creative activity of writing poems. In a study by Gaurav and Girijesh (2010), in-service teachers had more EC than when they were pre-service teachers as a result of exposure to experiences that relate to EC. This finding is also consistent with the study by Trnka et al. (2016), where arts students attained higher scores in EC than did students of other disciplines; students studying humanities also scored higher than did students studying economy and administration.

The present study did not reveal significant differences in EC by cumulative grade. Nor did it reveal significant differences in EC by the interaction between gender, specialization, and cumulative grade. This finding is in line with the study of Trnka et al. (2016) that reported no significant relationship between SAT performance and EC.

No significant differences were found in the present study between CP and gender. This could be due to exposure to the same circumstances contributing to mental development both inside and outside educational institutions. This replicates the findings of other studies (Al-Zghoul & Al-Dababi, 2014; Barakat, 2011; Charyton & Snelbecker, 2007; Furnham, 2016; Okereke & Ugwuegbulam, 2014; Saha, 2012; Wang & Huang, 2015) that found no significant differences in CP attributable to gender. However, it is not in line with the study of Piffer (2011) that reported a relationship between gender and CP.

Although the present study reported significant differences between EC and specialization, it did not report similar differences between CP and specialization; this could be due to the different nature of cognitive creativity and EC, which centers around emotions and ways to express them, whereas cognitive creativity centers around solving problems and finding associations in creative ways. Although CP is required in all specializations, our university education is still not very concerned with the development of students’ creative skills. This finding is consistent with Al-Zghoul and Al-Dababi (2014) and Arab and Alayed (2012). Nevertheless, it is not consistent with several studies (Barakat, 2011; Charyton & Snelbecker, 2007; Cheung et al., 2003; Piffer, 2011) that documented significant differences in CP by specialization; this inconsistency could be due to the different samples and specializations included.

As data of the present study indicated, cumulative grade proved to have had a significant effect on CP. Students with higher grades outperformed students with lower grades in CP. This can be attributed to the high mental abilities that underlie creative abilities in students with high grades. This same finding was reported in several studies (Barakat, 2011; Furnham, 2016; Gajda et al., 2017; Gautam, 2012). Yet, an inconsistent finding was documented by Ivcevic et al. (2007), where no significant relationship was found between cognitive abilities and CP. The interaction between gender,
specialization, and grade did not relate significantly to CP. This could be due to differences among participants who did not belong to the same geographical region. In addition, other factors such as socioeconomic status may affect CP.

**Implications and Limitations**

The theoretical significance of this study stems from the topic it tackled, that is, creativity. Furthermore, the role of emotion in creativity is still controversial. EC is a relatively recent issue in psychological and educational literature. Hence, it needs to be further researched, if this subject was discussed with other mental and personal variables, it is possible to extract many applications that reflect on the lives of individuals, their creativity, and personal relationships.

This study, therefore, can be a reference for researchers, in view of the novelty of research in the field of EC through its positive relationship with CP, which contributes to explaining some aspects that increase CP. From a practical perspective, university education planners can use this study and practitioners to help students fully realize their creative potential. The study raises a call to integrate all dimensions of EC (readiness, novelty, originality/effectiveness) into programs targeting CP among university students.

Considering the paucity of research in this area in the Arab world, from a practical perspective, this study can be utilized by university education planners and practitioners to help students make full use of their creative potentials. The study raises a call to integrate all dimensions of EC (preparedness, novelty, and originality/effectiveness) in programs targeting CP among university students.

The study was conducted on a cohort of students studying arts, education, and administration in two colleges at Al-Bakqa Applied University. A limitation that should be mentioned here is that the number of females was much larger than that of males. This in fact resembles the proportion of females and males in the target population where there were entire colleges for females only. However, the results of the present study concurred with some Arabic studies conducted in this area. Another limitation is that EC was investigated from Averill’s perspective and CP from Mednick’s perspective. In light of these limitations, the researchers recommend conducting further studies on this topic with other university populations. Replicating the study with other age groups such as preuniversity students is also recommended.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Funding**

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors extend their appreciation to the Deanship of Scientific Research at King Saud University for funding this work through Research Group Number RG-1438-064.

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