

Creativity Differences between Art and Engineering Students

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Abstract: creativity and innovation are increasingly recognized as crucial components of country success and progress. The main objective of this article is to explore creativity differences between art and engineering students of Shiraz University. The four components of creativity: Fluency, Originality, Flexibility and Elaboration were investigated using a multiple choice paper and pencil test which is called The Abedi-Schumacher creativity test. The Subjects were 160 art and engineering undergraduate students. It is hypothesized that art students are more creative than engineering students. 2 x 2 factorial design analysis and t-test results indicate significant differences among art and engineering students in terms of all four creativity factors.

Key words: Creativity, Fluency, Originality, Flexibility, Elaboration.

1. Introduction

The main objective of education is to nurture creative people who are able to do new things, not just to repeat what others have done (Arcaro, 1995). A creative idea or product is usually defined as original and appropriate scientific findings and theories; even imaginative conversations are deemed as creative products. On the other hand, reproduced and stereotyped products are not considered creative products, no matter how fine and elegant they are (Fisher, 2005). Otto (1998) states that creative thinking related to a cognitive process of creating several novels or unusual responses to a given special task. The degree to which learners can deal with such a task is referred to their creativity (Otto, 1998). Creativity and innovation play an important role in development of a country. Due to this fact, with investing on science and technology to improve the economy, nations could achieve desirable results to increase life standards of their people.

According to Torrance (1979), creativity is a process of becoming sensitive to problems, gaps in knowledge, deficiencies, missing elements and disharmonies. It also explains by identifying the difficulty; making guesses, searching for solutions or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and modifying and retesting them and finally communicating the results. Torrance is well known for developing the Torrance Test of Creative Thinking (TTCT) which is used in the business and education to assess individuals' capacity for creativity (Torrance, 2003). TTCT has five sub scales include; Fluency, Originality, Elaboration, Abstractness of Titles and Resistance to Premature Closure. Fluency is the number of relevant ideas which shows an ability to produce a number of figural images. Originality is the number of statistically infrequent ideas which shows an ability to produce uncommon or unique responses. The scoring procedure counts the most common responses as 0 and all other legitimate responses as 1. The originality lists have been prepared for each item on the basis of normative data which are readily memorized by scorers. Elaboration is the number of added ideas which demonstrates the subject's ability to develop and elaborate on ideas. Abstractness of Titles is the degree beyond labeling which is based on the idea that creativity requires an abstraction of thought. It measures the degree of title that moves beyond concrete labeling of the pictures drawn. Resistance to Premature Closure is the degree of psychological openness which is based on the belief that creative behavior requires a person to consider a

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variety of information when processing information and to keep an “open mind” (Kyung, 2006). There are different studies which investigate the subject of creativity (Charlton, 2009; Heinze, Shapira, Rogers, & Senker, 2009; Ivcevic, 2009; Simonton & James, 2007; Yusuf, 2009) in relation to academic achievement (Lau & Roeser, 2008; Steinmayr & Spinath, 2009), creativity and academic achievement (Coyle & Pillow, 2008; Steinmayr & Spinath, 2009) academic achievement and gender (Barkatsas et al 2009; Penner & Paret, 2008) as well as creativity and gender (Naderi et al., 2008). However, this study contributes to the literature by examining the creativity difference between art and engineering students for the first time. Overall, this study tries to address these questions:

What is the creativity difference between art and engineering students?

What is the difference between female and male students in terms of creativity?

The discussion in this paper is organized as follows. In next section (2) the relevant literature is discussed, in section (3) the research method (participants, procedures and material) is explained, in section (4) the research result is analyzed and in section (5) the discussion and conclusions are presented.

2. Literature Review

A vast majority of studies have been done on creativity among college students. For example; Ai (1999) examined the relationship between creativity and academic achievement. Participations were students from 68 schools. They were completed three creativity tests; the Torrance Test of Creative Thinking (TTCT), the Abedi-Schumacher Creativity Test (CT) and the Villa and Auzmendi Creativity Test (VAT). The academic achievement of the students was measured by self-reported achievement in six subject areas: Spanish, Basque, English, natural science, mathematics and social science. Results demonstrate when operationalized by their grades, creativity was related to academic achievement for both boys and girls. Naderi et al (2010) extends this study by examining the relationship between creativity and academic achievement and difference between males and females. In this research, creativity was measured using the Khatena-Torrance Creative Perception Inventory (KTCPI) test. The results showed that creativity is related to academic achievement for both male and females.

Zmudka (2006) examined the association between creativity style and choice of musical career between university students. The subjects were 74 students enrolled in one of four majors in music; music education, music therapy, instrumental performance and jazz performance which assessed by "View: An Assessment of Problem Solving Style" which included 34 items defining problem-solving style across three dimensions including Orientation to Change (OC), Manner of Processing (MP), and Ways of Deciding (WD) scales. Demographic information concerning subjects declared major, preferred musical career and level of education were also provided. The results showed the significant differences between the four groups on the OC and WD dimensions when using preferred musical career as the category variable. Also, research results found no differences when major was used as the category variable. More analysis suggest problem-solving style is likely to be associated with problem types which found in specific musical activities and therefore a musician's preferred career in music (Zmudka, 2006). Wang (2011) compared creative thinking differences between student teachers in Taiwan and the United States and tried to find the important factors which may cause these differences. The results showed that the most distinctive difference between the two groups of subjects is the ability of elaboration. The results proposed that creative thinking is strongly related to beliefs than practices. The findings also showed that strong belief in a particular teaching perspective, whether product-oriented or process-oriented may have a negative effect on creative thinking and developing reading, writing and self-expression abilities are likely to help developing the ability of elaboration (Wang, 2011). Regarding the review of literature on comparison of creativity among different university students, there are not enough studies that examine this issue. This study tries to fill this gap in the literature.

3. Method

3.1. Participants and Procedures

Participants in this research were 200 university students that dividend into two groups; 100 from an art school and 100 from an engineering school. All students who had been in first or second semester during the

research period was contacted through letter and invited to participate in the study. It was estimated that more than 50% of contacted students accept to participate in the study.

3.2. Material

Abedi-Schumacher Creativity test: In this instrument all participants received a multiple-choice paper-and-pencil test called the Abedi-Schumacher Creativity Test (CT) which was developed by Auzmendi (1996) in an attempt to shorten the amount of time needed for the scoring and administration of creativity tests. This instrument was translated into Spanish and was implemented by the Torrance Tests of Creative Thinking (TTCT) and the Villa and Auzmendi Creativity Test (VAT) to 2,270 students in Spain. Moreover, Teacher ratings of student creativity test were examined. They found significant but low correlations between the 4 CT subscale scores and the students' academic achievement measures and TTCT subscale scores. Results indicate that the reliability coefficient of the CT subscale scores was at an acceptable level. However, the correlation coefficients between the CT and the TTCT and VAT were moderate or higher. The results of this research have influenced further modification of the CT test items (Auzmendi & Abedi, 1996).

4. Results

The data were analyzed on the basis of comparing the creativity between two groups of art and engineering students. The results of two-way analysis of variance and t-test explain the differences between creativity performances among two groups of students.

At first, the creativity mean scores of art and engineering students were compared. The results of T-test represented a significant difference between two groups of students. Second, the differences of creativity mean scores between male students and female students were examined. The results of T-test indicated that there is no significant difference between male and female students in terms of creativity performance. Finally, it was tested if sex and university major influenced creativity performance or not. The results of two-way analysis of variance sex and university major are represented in table 1.

Table 1 Test of between subject Effect: Two-way Analysis of Variance Sex and University Major

Source	Sum of Squares	df	Mean Squares	F	Sig
Sex	62.02	1	62.02	2.25	0.05
University Major	1490.02	1	1490.02	53.97	0.01
Sex*University Major	98.8	1	98.8	3.58	0.05
Error	1546.15	56	27.61		

According to Table 1, F is significant for university major variable; it means there is a significant difference between art student's creativity and engineering students' creativity. Due to this fact that F is not significant for sex variable, thus there is no significant difference between creativity performance of female and male students.

5. Discussion

Creativity is defined as a combination of innovation and appropriateness and has been associated with problem-solving (Berglund and Wennberg, 2006). Creativity is one of the most important topics in educational psychology. In this research, creativity difference between art and engineering students was investigated. The results support the research hypothesis that art students are more creative than engineering students. To conclude, this research provides empirical support for the relationship between creativity and

university major. The results also showed that there is not existed gender difference regarding creativity between art and engineering students. However, Stoltzfus et al (2011) found that male performance on creativity measures generally is better than females.

The current study contributes to our knowledge about the conditions and context surrounding creativity. But, like other studies, this research has some limitations. First, the length of questionnaire that was decreased to not make bored the students which may influence the results of research. The second limitation is related to the low number of samples which is limited the generalization of research results. Regarding to these limitations, more researches are needed on this topic to be undertaken about the association between university major and creativity for more understandings. Further study with more focus on courses in university and also investigating the impact of creativity on learning ability might explore more knowledge about this issue.

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