

The Efficacy of Play on Divergent Thinking of Adult Learners

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Abstract

According to the literature, empirical links between play and divergent thinking in children were found. However, the potential effects of play in adults in terms of promoting creativity are underestimated. As a result, the purpose of this study was to investigate the possible benefits of play behavior in adult classrooms in order to facilitate creativity. The results of the present study lend some support for the effects of play on divergent thinking in adults. In respect to ideas generation, the results did not show a significant difference between experiment and control groups. Nevertheless, with regard to originality, it showed a significant difference between the two groups. The participants perceived play intervention as producing more unique ideas than the control group. The implication of the findings and future research were also discussed.

Keywords: Creativity, Play, Divergent thinking, Adult learners

Introduction

Creativity is a complex and multifaceted phenomenon (Amabile, 1996; Csikszentmihalyi, 1996; Gardner, 1993). The creative person, process, product, and the interaction with the environment are the vantage points which are the most frequently discussed in creativity literature (Barron & Harrington, 1981; Hennessey & Amabile, 2010; Runco, 2004). For example, Sternberg and Lubart (1995) suggest six possible resources that are required for creative work: intelligence, knowledge, thinking styles, personality, motivation, and environmental context. In Piaget's view, the creative process stems from play. Creative thinking is assimilation, which is the interaction between imagination and environment. During the process of accommodation, the creative product is manifested by this mental experimentation. The relationship between assimilation and accommodation is not linear but intertwined (Ayman-Nolley, 1999).

A number of studies have demonstrated the mechanism that pretend play facilitates creativity through cognitive and affective processes in children (Dansky & Silverman, 1973; Howard-Jones, Taylor, & Sutton, 2002; Moore & Russ, 2008; Russ & Kaugars, 2000; Russ & Schafer, 2006; Saracho, 1992). Their major findings lend support to empirical links between play and divergent thinking. However, the potential effects of play in adults in terms of promoting creativity are underestimated. As a result, the purpose of this study is to investigate the possible benefits of play behavior in adult classrooms in order to facilitate creativity. Further, it is possible to provide some insights into the concept of play for adult pedagogy. The aim of current study was to investigate (1) the relationship between academic performance (GPA) and divergent thinking (fluency and originality) and (2) the prediction that play intervention would tend to increase divergent thinking as measured by the numbers of responses produced (fluency) and unique responses (originality).

The Relationship between Play and Divergent Thinking

In psychological literature, divergent thinking is closely married to creativity (Gardner, 1993; Guilford, 1957; Torrance, 1988; Williams, 2004). Indeed, divergent thinking is viewed as one major element of the cognitive process in creativity (Dirkes, 1978; Guilford, 1970; Runco, 2004). Divergent thinking is dependent on fluidity of thinking and free association, which is independent of intelligence (Fasko, 2006; Sternberg & Lubart, 1995; Sternberg, 2006).

Play provides an arena for creative activities and processes (Hennessey & Amabile, 1987; Saracho, 2002). Some observations of creative adults uncovered that their work processes stem from some aspect of child's play (Root-Bernstein & Root-Bernstein, 2006). Theoretically, pretend play and creativity are interconnected under the structure of cognitive and affective processes (Russ, 1998, 2003). To some extent, play and creativity may share the same prime configuration (Saracho, 1992). Vygotsky delineated a developmental view of adolescent creativity that underlines the interactions between imagination and reasoning which lead to more mature and productive forms of creative thinking in adulthood (Ayman-Nolley, 1992). The transition from imagination and fantasy of childhood to adolescence, according to Vygotsky, is changed into content and nature. With the increase of social experiences and maturation of both emotion and intellect, adults enjoy creativity with depth and complexity.

Based on a review of the literature on creativity and play, Russ (1998) proposed a model that involves the cognitive and affective processes in creativity and also identified several fruitful connections between two variables: divergent thinking, transformation abilities, expression of emotion, and expression of affect-laden fantasy (p. 476). From the affective perspective, her study exhibits the utilization of fantasy and imagination in early pretend play, which in turn develops a broad repertoire of free flow of associations. The interplay between play and creativity is grounded in this broadened associative network that is beneficial for developing divergent thinking and creative problem solving (Dansky, 1980; Lieberman, 1965; Russ & Kaugars, 2000).

Creativity Tests

The application of creativity tests has been well documented in research on cognitive skills, the identification of gifted children, classrooms, and organizations (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Feldman & Benjamin, 2006; Simonton, 2000; Torrance, 1977; Treffinger & Isaksen, 2005). Guilford (1956, 1959) initially proposed using a psychometric approach for the measurement of creativity with the focus on divergent thinking ability. In line with this notion, Torrance (1974) developed the Torrance Tests of Creative Thinking (TTCT), which is the most frequently used measure of creativity in empirical research (Baer & Kaufman, 2006; Torrance, 1995; Torrance & Goff, 1989). It measures four dimensions of divergent thinking: fluency (the number of ideas), flexibility (the number of ideas in different categories), originality (the number of infrequent ideas), and elaboration (the number of detailed ideas) (Davis, 2006; Kim, 2007; Mueller, 1978). Although TTCT enjoys its well-known reputation for creativity research, the major deficiency is grounded in the lack of validity. In other words, this paper-and-pencil assessment does not warrant real-life creativity (Houtz & Krug, 1995; Runco, 2006).

In terms of real-word creative products, Amabile (1982, 1996) developed the Consensual Assessment Technique (CAT). In the CAT, participants are asked to create poems, collages, or stories and those products will be independently evaluated by experts with the criteria of novelty and appropriateness. Experts judge artifacts based on their own perception of creativity. Generally, interrater reliabilities among judges are quite satisfactory, ranging from .70 to .90 (Amabile, 1996; Hennessey, 2003; Hennessey & Amabile, 1988). CAT is useful to compare creativity within or between groups on the same task; however, because of the nature of creativity (the creativity variance from domain to domain), CAT is not helpful to compare individuals' creativity more generally (Baer, Kaufman, & Gentile, 2004).

Method

Because of the availability of the participants, the quasi-experiment (Creswell, 2007) was used for this study. Further, the convenient sampling was used and participants were recruited from a south Texas private university.

Participants

Two intact classes of adult education (Program Development and College Teaching) were assigned at random, Program Development as an experimental group (11 students) and College

Teaching as a control group (7 students). A total of 18 adult students (6 male and 12 female) participated in this study. Within those adult students, the majority were Hispanic (47%); 10 were graduate students and 8 were doctoral students. Their average age was 38 ($SD = 11.99$).

Intervention

Based on play literature, the major intervention of play sessions is either using puppets or some kind of toys for children to explore (e.g., Dansky & Silverman, 1973; Russ & Schafer, 2006). Research has shown the effectiveness of collage on creativity in adults (Amabile, 1982; Simpson, 2009). Therefore, for the purpose of this study, the intervention was a creative collage-making activity for adult learners. The instruction was given to participants as follows

You are invited to create a collage. We will provide a set of pre-cut construction paper shapes with all kinds of colors, a bottle of glue, and a blank white A3 paper. You will not be given a pair of scissors. Rather, you will need to use your hands to tear down the color papers and use the glue to complete the collage. The reason is that we want you to play with material and have fun. The topic of the collage is “As an adult, how do you perceive the learning?” Please use your “imagination and creativity” to finish this activity. You will have 20 minutes to create your unique collage. Before you start, please complete the background information as follows. Hope you enjoy this activity!

Measures

The divergent thinking task was used to measure the fluency and originality of participants. Participants were asked to use their imagination to list possible responses in the answer sheet. The question was as follows:

Image a college in 2022 what will happen in this setting? What changes do you foresee? Please use your imagination to list possible characteristics of a college in 2022. Remember the more responses the better! You will have 10 minutes to finish this task. Good Luck!

The evaluation of responses to the creativity task for fluency and originality was calculated in a manner similar to that used by Torrance (1974). Fluency is the number of responses to the problem. The higher the number of responses, the more the scores an individual will receive. With regard to originality, a total of points awarded for each response as follows: Two points will be given for responses suggested by 1% of the students. One point will be awarded for responses that were answered by 5% or fewer students. No originality points will be granted for ideas given by 6% or more of the students.

Procedure

An informed consent form was distributed to participants to explain the purpose of the study. Students from the experimental group had 20 minutes for the play session (creating a collage) and then 10 minutes for the divergent thinking task. During the play session, the salient instruction was given, “Use your imagination and play with the material to create a collage.” Immediately following the play session, each student was given a divergent thinking task by the same individual who administers the experimental treatment. This test session lasted 10

minutes. The instructor encouraged participants to think outside the box to list more possible answers.

The control group was given a divergent thinking test without any treatment. The instructor encouraged participants to use their imagination and to create as many ideas as possible. The test session lasted 10 minutes.

Results

Table 1 shows the intercorrelations among age, GPA (student grade-point average), fluency, and originality. A Pearson correlation coefficient showed only that fluency and originality was strong positive correlated, $r(16) = .66$, $p < .01$, indicating a significant linear relationship between two variables. In addition, age and originality were moderate negatively correlated. In contrast, a moderate positive correlation was found between GPA and originality.

Table 1. Intercorrelations Among Age, GPA, Fluency, and Originality

Measure	1	2	3	4
Age	--			
GPA	.12	--		
Fluency	-.01	.15	--	
Originality	-.35	.37	.66**	--

Note. Age ($n = 15$), GPA ($n = 11$), fluency and originality ($n = 18$)

** $p < .01$.

An independent-sample t test was calculated comparing the mean scores of GPA, fluency, and originality. As Table 2 showed, no significant difference ($t(9) = 1.06$, $p > .05$) was found between the experimental (play) and control groups in terms of GPA. Furthermore, no significant difference ($t(16) = .20$, $p > .05$) was found between the experimental and control groups in terms of fluency. However, with regard to originality, a significant difference was found between them, $t(16) = 2.60$, $p < .05$. The mean of the experimental group was significantly higher ($M = 12.09$, $SD = 4.87$) than the mean of the control group ($M = 6.86$, $SD = 2.61$). Specifically, Cohen's $d = .$, showed a large effect size (Cohen, 1988).

Table 2. Group Differences for Divergent Thinking Tasks Between Groups That Experienced Play Session and Did Not Experience

Measure	Play group		Control group		<i>df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	M	SD	M	SD				
GPA	3.81	.12	3.7	.24	9	1.06	.32	.58
Fluency	12.18	4.24	11.71	2.43	16	.20	.80	.14
Originality	12.09	4.87	6.86	2.61	16	2.60	.02	1.34

In order to further analyze the relationship among GPA, fluency, and originality, a simple linear regression was calculated. The results showed GPA did not predict either fluency or originality. However, the regression model was calculated predicting originality based on fluency. A significant regression equation was found, $F(1, 16) = 12.63$, $p = .003$, with an adjust $R^2 = .406$, indicating large effect sizes (Cohen, 1988). As Table 3 showed, participants' fluency of ideas was a significant predictor of originality. The more ideas they produce, the more unique ideas will be generated.

Table 3. Linear Regression Analysis for Fluency Variables Predicting Originality

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Constant	-.72	3.16		-.23	.82
Fluency	.90	.25	.66	3.55	.003

Note. $R^2 = .441$ ($N = 18$).

Discussion

The results of the present study lend some support for the effects of play on divergent thinking in adults. Concerning age, the results showed a weak negative relationship between age, fluency, and originality. Nevertheless, this relationship is not significant. Consequently, it seems plausible that age is not an issue for creativity, especially in terms of idea generation.

Creativity literature has noticed creativity and intelligence are different construct (Amabile, 1996; Simonton, 1999). Current study supports this notion and shows academic performance (GPA) not only had a weak correlation with fluency and originality of ideas, but also did not predict either fluency or originality. It could be concluded that participants' creative performance in terms of fluency and originality was not related to their academic performance.

In respect to ideas generation, the results did not show a significant difference between experiment and control groups. It seems that the play activity did not have a marked effect on the fluency of ideas. The results of findings are not in line with other studies (e.g., Dansky, 1980; Dansky & Silverman, 1973; Moore & Russ, 2008; Russ & Kaugars, 2000). However, it should be recognized that the nature of those studies is different from the current study. For example, the participants from those studies were children. Furthermore, the stimulus materials were toys or puppets, specifically for this group. To date, no proper stimulus materials in terms of play activities are suitable for adults. To some extent this poses a research gap for future research to discover other useful materials. Presumably, several reasons might explain these unexpected findings. First, it is possible the topic of collage-making activity does not stimulate participants' imagination. Second, perhaps the task itself does not serve as a proper play strategy to arouse strong affective emotions and in turn lead to produce many responses. Finally, it is also possible the scenario provided in the divergent test is not sufficiently creative. For example, some participants suggested the test in this study was too real for them to surface creative ideas.

With regard to originality, the current study however showed a significant difference between the two groups. The participants perceived play intervention as producing more unique ideas than the control group. Specifically, this effect was significant and suggested that the play activity could temporarily increase producing unique ideas. In addition, the regression model indicated that the fluency of idea generation could predict unique ideas participants produced. This result supports Simonton's (1988) research findings. He found that sheer quantity of output is a strong predictor of quality with the examination of scientists and artists' works. Finally Simonton (1988) suggested that "creativity is a probabilistic consequence of productivity" (p. 254).

Limitations of the Study

Before concluding this study, several limitations should mention for interpretation of the findings from the current study. First, convenience sampling was used for this study from a small, private university in the United States. Runco and Albert (1985) have noticed that homogeneity of the sample might affect results of divergent thinking tests; therefore, using diverse samplings might lead to different results. Further, current study recruited only 18 adult students from one institution. Larger sample sizes and diverse groups could contribute to clearer effects of play on divergent thinking. In addition, the current study utilized a short-term experimental treatment. As Torrance (1974) suggested, longitudinal studies of creativity will increase the better understanding of effects of creativity training. With regard to the scoring method, this study followed Torrance's (1974) suggestions; however, Kaufman, Plucker, and Baer (2008) have identified different scoring systems that might lead to different

results. They also suggested consumers of divergent thinking tests should notice that other meaningful scores could be considered in addition to fluency and originality. As a consequence, for a future study it will be beneficial to examine other facets of creativity. Finally, a collage-making activity was used as a play strategy for the current study. It is possible that using different play strategies might arrive at different results. It is suggested adult educators could try different play strategies to promote creativity in their classrooms. Moreover, future researchers could also examine the effects of different play activities.

Conclusion

According to findings from this study, it seems like a play strategy could temporarily increase original ideas in terms of creativity. Although the results did not show the significant difference between experimental and control groups in terms of idea generation, the fluency of ideas play group was still higher than its counterpart. It is possible that the play (collage-making activity) used in the current study neither aroused imagination of participants nor stimulated their creative thinking. More research related to the play strategy on adults needs to further investigate.

Given the evidence available at this juncture, at least three future research directions could be considered. First, what stimulus material could be used that would result in better results in promoting creativity? It needs further research to examine different stimuli. Second, adult educators should consider how to use this play strategy in adult classrooms. As the current study demonstrated, play activity could function as a useful mechanism to facilitate creativity. As a result, adult educators could bring play-like activities into adult learning contexts, thereby stimulating learning strategies. Finally, the focus of the current study is to investigate the effects of play on fluency and originality. However, it captures only one of several elements of creativity. For future study it could be beneficial to examine other attributes of creativity, such as problem identification (Csikszentmihalyi & Beattie, 1979) or problem solving (Treffinger & Isaksen, 2005).

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