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A Review of the Effectiveness of Creative Training on Adult Learners

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Abstract

A demand for fostering creativity has become a universal discourse across different nations, reflecting globalization of economic activity. Teachers play a key role in promoting creative thinking through appropriate approaches in the classroom. Because a number of studies indicate that most creativity research focuses on children rather on adults, the purpose of this meta-analytic study is to investigate the effects of creativity training on adults. It is hoped that by providing evidence-based findings, adult educators could consider fostering creativity in adult classrooms. The results confirm the findings of previous meta-analysis indicating that creativity training is effective on adults. The magnitude of this finding indicates creativity training is promising for increasing adults' creative thinking.

Keywords: Creativity, Creativity training, Meta-analysis, Adult learners

1. Introduction

The essence of creativity is prospective rather than retrospective. A demand for fostering creativity has become a universal discourse across different nations, reflecting globalization of economic activity (Craft, 2003; Newton & Newton, 2009). The function of education serves as a building block of human capital through equipping students with knowledge and creative capacities (Lin, 2011; NACCCE, 1999; Shaheen, 2010). A number of scholars have argued the importance of creativity development in higher education. Most importantly, they pointed out that teachers play a key role in promoting creative thinking through appropriate approaches in the classroom (Kleiman, 2008; Livingston, 2010; Young, 2009). Three lines of inquiry are found in the literature: creative teaching (e.g., Gibson, 2010), teaching for creativity (e.g., Jeffrey & Craft, 2004), and creative learning (e.g., Lucas, 2001). Among three categories, teaching for creativity is the main focus in the literature of creativity in education, where various creativity-training programs are used and tested in the classroom.

Rose and Lin (1984) conducted a quantitative meta-analytic study of creativity training with the use of Torrance tests scored for fluency, flexibility, originality, and elaboration. The results from 46 studies showed an overall moderate effect size. In general verbal creativity was more affected by these programs than figural creativity. Scott, Leritz, and Mumford (2004) conducted another quantitative meta-analysis of creativity training with a careful examination of external validity, internal validity, course content, and delivery method. The results of 70 studies confirmed prior research by Rose and Lin (1984) and Torrance (1972a) that creativity training is effective with the evidence of a large effect size (r = 0.68) for the overall analysis and sizable effects for each of the four criteria (divergent thinking, problem solving, performance, as well as attitudes and behavior). They concluded that there are potential benefits of creativity training programs for a variety of people, not only for gifted students. They also observed that the most successful creativity training models are grounded in the procedure for the generation of new ideas, specifically problem finding and conceptual combination, which concerns the application of cognitive capacities. More recently, Ma's (2006) meta-analysis of creativity training on 34 studies revealed a large effect size (grand mean effect size 0.77), which further confirmed Torrance's (1972a) initial investigation. Moreover, it showed older adults had more successful training effects than younger ones. The effect size for college students was less than for high school students.

A sampling of studies shows that creativity research focuses primarily on children (e.g., Tan, 2007; Torrance & Myers, 1970) or elite adults (Simonton, 1988a, 1988b). However, a limited number of those studies are devoted to laypersons in adult groups. It is obvious that a research gap exists in the study of creativity in adult contexts. As a result, the purpose of the current study was to use a meta-analytic method to investigate the effects of creativity training on adults. The ultimate goal of this study is to provide evidence-based findings, thereby encouraging adult educators to consider fostering creativity in adult learners.

2. Creativity Training Programs

Bull, Montgomery, and Baloche (1995) reviewed college level creativity courses and identified four general approaches including (a) cognitive approaches, (b) personality approaches, (c)

motivational approaches, and (d) social interactional approaches. Lau, Ng, and Lee (2009, pp. 72-73) also found several creative-thinking techniques were used for promoting creativity and they categorized these approaches into five groups: (a) identifying and mapping attributes (e.g., mapping notes or critical analysis), (b) making possibilities (e.g., brainstorming), (c) changing and shifting perspectives (e.g., divergent thinking), (d) making associations and analogical thinking (e.g., lateral thinking), and (e) probing emotion and the subconscious (e.g., Lucid Dream Techniques).

Besides differences in meta-theoretical models, Scott et al. (2004) also pointed out two other distinctions that influence the content and structure of creativity training. First, the theoretical models that shape training interventions bear some aspect of creativity, such as lateral thinking, productive thinking, and creative problem solving. Another noteworthy difference is between general techniques across different situations and domain specific training for special purposes. Dineen, Samuel, and Livesey (2005) suggested creativity in learners is encouraged by three conditions: (a) supportive, student-centered environments, (b) non-hierarchical teaching styles, (c) teaching methods and tasks, and (d) assessment systems (p. 159).

To date, the most frequently used and most successful model that facilitates creative learning in the classroom is the Creative Problem Solving (CPS) model. Based on a review of 133 empirical studies with children, Torrance (1972a) found that the most effective approach for promoting creativity in the classroom is the use of various modifications of the Osborn-Parnes Creative Problem Solving (CPS) training program. After examining these studies, Torrance (1972b) identified a common theme in those effective programs, namely, they include two important elements: cognitive and affective attributes that provide students opportunities to practice creative thinking.

The focus of this program is to train students to solve problems in a systematic and effective way (Meadow & Parnes, 1959; Parnes & Noller, 1972). It was initially conceptualized by Osborn (1953) and refined by Parnes (1967a, 1967b). The CPS model can be employed in any groups from pre-school students to adults (Torrance, 1978). Based on this model, the most well-known tool is brainstorming, which is widely used in group settings of organizational environment and education fields. The technique of brainstorming attempts to give free reign to imagination for the sake of evoking ideas and encouraging participants to express their thoughts without judgment. Brainstorming has been incorporated as a major ingredient in the CPS model (Meadow, Parnes, & Reese, 1959; Parnes & Meadow, 1959).

The CPS process is composed of three stages: understanding the problem, generating ideas, and implementing them. Six steps guide this process: mess finding, fact finding, and problem finding are the first stage; idea finding is the second phase; and solution finding and accepting finding are the last step. Each of the stages involves two cycles: brainstorming to generate ideas for consideration and an evaluative phase to filter those possibilities (Davis, 2006). Treffinger (1995) refined the steps further and clustered them into three components: understanding the problem, generating ideas, and planning for action. More importantly, he identified the CPS framework not as a linear model but rather a flexible process that fits an individual's learning style and personality.

3. Method

3.1 Literature Search

The EBSCOhost Database, the ProQuest Educational Journal, ProQuest Dissertations & Theses, Business Source Complete, and the ABI Inform Complete were scanned for a search of creativity training in different conditions, setting the limitations of the search in English speaking nations, peer-reviewed journals, and publication date from 1980 to 2012. Using the University of the Incarnate Word library through the website search engine, the search terms "creativity training" and "creativity" were used. In addition, some usable empirical studies were traced from the references of Scott et al. (2004), Rose and Lin (1984), and Ma (2006) studies. As Chen, Kim, Moon, and Merriam (2008) found, the majority of adult research focuses on the context of formal learning. Thus, for the purpose of this study, the major focus is concerning the effects of creativity training in the formal learning settings rather than government, private, non-profit organizations. The research and review process occurred during December of 2012.

3.2 Criteria of Selection

In order to obtain insights from this meta-analysis, selected students were following the criterion. First, the study must be related to creativity training and provided creativity measurement information. Second, the study must involve enough empirical data for the statistics needed to calculate the effect size. In addition, studies with no control group were eliminated because of no reference group as a baseline. Finally, the nature of sampling was also taken into consideration. In the current study, the purpose was to investigate the effects of creativity training programs on adults, so graduate students or subjects with mean age over 25 were included in this meta-analysis, whereas children, high school and undergraduate students in the classroom environment were excluded.

Some studies where creativity scores were not measured or using an inventory for self-assessment of creative performance were viewed as of poor quality, and therefore not included. If studies omit non-significant results, it is suspicious that the validity of the study; therefore, they were not included in this study. There were initially 14 targeted articles, however, because of several preceding issues, in the end, a total of 11 studies were selected for the further analysis.

3.3 Coding of Data

After all relevant articles were selected, each study was coded as follows: (a) author, (b) date of publication, (c) published (journal articles) or unpublished (dissertation) information, (d) subject's demographic information (age and category), (e) sample size, (f) type of experiential design (post-only or pre-post), (g) types of interventions and training techniques (independent variables), (h) creativity measurement used in the study (dependent variables), and (i) training time period in minutes. All the coding was keyed in Microsoft Excel and effect sizes were then calculated.

3.4 Computations of Effect Sizes

Effect sizes were calculated from the means and standard deviations of the outcomes of the experimental and control groups. When mean or standard deviations were not available from reports, effect size was calculated from *t*-test and *F* statistics. In each study, all of the subscales' effect sizes were assessed, then, averaged into one single effect size index to present the effect of the study. If there was more than one treatment group, each would be calculated separately. Both estimations of effect sizes: Cohen's d and correlation coefficient (*r*), which were commonly used in meta-analysis, were employed. In addition, the value obtained for*d* was obtained by using the standard deviation of the control group. The formulas used in the calculation were followed the equations suggested by Cooper and Hedges (1994, pp. 232-239):

$$es = \frac{Me - Mc}{SDc} \tag{1}$$

$$es = \frac{Me - Mc}{\sqrt{\frac{(n_e - 1)SD_e^2 + (n_c - 1)SD_c^2}{n_e + n_c - 2}}} \tag{2}$$

$$es = \frac{t(n_e + n_c)}{\sqrt{n_e n_c (n_e + n_c - 2)}} \tag{3}$$

$$es = \frac{2\sqrt{F}}{\sqrt{df}} \tag{4}$$

$$es = \frac{M_e 2 - M_c 2}{SD_c 2} - \frac{M_e 1 - M_c 1}{SD_c 1} \tag{5}$$

In these equations, *es* is the effect size, *Me* is the mean of the experiential group, *Mc* is the mean of the control group, *SDc* is the standardized deviation of the control group, n_e is the sample size of the experiential group, n_c is the sample size of the control group, *Me2* is the mean of the experiential group on the posttest, *Mc2* is the mean of the control group on the posttest, *Me1* is the mean of the experiential group on the pretest, *Mc1* is the mean of the control group on the pretest, *SDc2* is the standard deviation of the control group on the posttest, and *SDc1* is the standard deviation of the control group on the pretest. An equation was used according to the nature of the data found in the articles. Equation 2 was preferred to Equation 1 because the former utilized the poor standard deviation. Equation 3 and 4 were employed only if no means and standard deviation were given. For studies that contained pre- and post-test, the effect sizes were calculated with the Equation 5.

4. Results

All data were obtained by one reviewer. Studies that met the inclusion criteria regarding the targeted outcomes were reported in Table 1. An analysis of interventions by type of treatment

is also reported. The type of treatment data was retrieved from the published studies. Timing of intervention implementation is also presented. The duration of intervention was found between a half hour and ten weeks.

Table 1. Characteristics of included studies

Study	Study design	Participants	Interventions	Outcomes
Fontenot (1993)	Randomized experimental-control test	62 American business people (14 females, 48 males)	Osborn-ParnesCPS(6hr)	Fluency in data finding, fluency in problem finding, flexibility in problem finding, and quality of the problem statement
Gendrop (1996)	Pre-post test	97 professional nurses	Synectics: paradox, analogue, unique activity, and equivalent (10 hr)	TTCT(verbal), and GCPST
Gist(1989)	Randomized experimental-control test	59 managers (16 females, 43 males)	Innovative problem solving (brainstorming + brainwriting) (4.5 hr)	Idea quantity and idea divergence
Benedek et al. (2006)	Pre-post test	36 German adults (19females, 17 males)	Verbal creativity & functional creativity (24 min)	VKT: ideational fluency & ideational originality
Ogilvie & Simms (2009)	Randomized experimental-control test	89 professional accounting MBA students (47females, 41males)	Creative decision making (30 min)	Novel solution
Kabanoff & Bottger (1991)	Pre-post test	64 MBA students (13 females, 51males)	Osborn-ParnesCPS (10weeks)	TTCT(verbal)
Basadur, Pringle, & Kirkland (2002)	Pre-post test	168 Spanish-speaking South American managers	Osborn-ParnesCPS (4hr)	Preference for active divergence
Basadur, Wakabayashi, &Takai (1992)	Pre-post test	107 Japanese managers	Osborn-ParnesCPS (4hr)	Preference for active divergence
Albano (1987)	Pre-post test	174 U.S. Army	Relaxation/visual stimulation + invention (20 hr)	TTCT (figural & verbal)
Wang & Horng (2002)	Pre-post test	72 R&D workers (13 females, 96 males)	CPS (12hr)	TTCT (figural)
Massetti (1996)	Post-only test	43 MBA students	Software (IdeaFisher&Ideatree)	Idea fluency novelty, & value

Note. TTCT = Torrance Test of Creative Thinking; GCPST = Gordon Creative Problem Solving Test; CPS = Creative Problem Solving; VKT = Verbaler Kreativitats test (German verbal creativity test).

All treatments were designed to increase creativity of adults. The treatments are classified as follows. The first is problem solving and decision making (CPS, brainstorming, and Creative Decision Making). The main purpose of these training is to use creativity to solve ambiguous problems. Generally, there are four stages: identifying problems, generating solutions, evaluating solutions, and elaborating a solution. Second type is ideation training, including Synectics and Idea Fisher & Ideatree. The main focus of these techniques is combining different and apparently irrelevant elements in order to create new ideas by means of analysis, substitute, rearrange, metaphor, and analogy. The last is visual/verbal stimulation, which involves incubation techniques by producing an unexpected "aha" insight. It involves undedicated, inactive, relaxed, unconscious mental constructs through a series of visual or verbal stimulus. The outcome scales used to measure creativity include fluency, flexibility, originality, elaboration, and attitude. This finding is probably because the majority of studies utilized TTCT (Torrance Test of Creative Thinking) or divergent-thinking tests, which are the most popular paper-and-pencil creativity assessments (Kaufman, Plucker, & Baer, 2008).

The first objective of this review was to evaluate the effects of evidence-based creativity training for adults. Table 1 shows the characteristics of 11 studies and these studies provided eight treatments with a total of 971 participants contributing to this analysis. As Table 2 shows, the effect sizes of most studies (n = 7) were medium to large. In addition, the fact that the associated CI included a negative value indicates the average effect size was not significantly greater than zero at $p < 0.05$. Three of the included studies noted small effect size ($p > 0.05$) and only one study showed no effect ($p = 0.93$). The average weighted effect size (Cohen's d) for all studies was 0.81 and the average weighted effect size (r) was 0.35. This result indicates the effect size of creativity training was medium.

Table 2. Effect sizes of included studies

Study	*N*	*r*	*d*	95% CI	*P*
Fontenot (1993)	62	0.46	1.04	[0.24, 0.75]	< 0.001
Gendrop (1996)	97	0.33	0.70	[0.24, 0.75]	0.001
Gist(1989)	59	0.64	1.66	[0.50, 1.02]	< 0.001
Benedek et al. (2006)	36	0.23	0.47	[-0.11, 0.58]	0.18
Ogilvie & Simms (2009)	89	0.25	0.51	[0.04, 0.47]	0.02
Kabanoff & Bottger (1991)	64	0.26	0.54	[0.02, 0.52]	0.04
Basadur, Pringle, & Kirkland (2002)	168	0.12	0.38	[-0.03, 0.27]	0.12
Basadur, Wakabayashi, & Takai (1992)	107	0.46	1.05	[0.31, 0.69]	<0.001
Albano (1987)	174	0.58	1.45	[0.51, 0.81]	<0.001
Wang & Horng (2002)	72	0.01	0.1	[-0.23, 0.25]	0.93
Massetti (1996)	43	0.29	0.58	[-0.01, 0.61]	0.06

The second objective was to compare the relative effectiveness of assessment of creativity for adults. For this analysis, studies were grouped according to type of different measurements (see Table 3). From the 11 studies, measurements of creativity were categorized into five

types. Comparing these five assessment types, four had medium to large effect sizes between r = 0.24 and 0.58 (d = 0.57 and 1.42, $p < 0.001$). However, elaboration had no effect (p = 0.92).

Table 3. Effect sizes by measurement tools

Type of measurement	n	k	r	d	p
Fluency	448	10	0.54	1.29	< 0.001
Flexibility	291	6	0.58	1.42	< 0.001
Originality	421	9	0.43	0.95	< 0.001
Elaboration	93	2	0.01	0.03	0.92
Attitude	209	2	0.24	0.57	< 0.001

Note. k = number of samples.

5. Discussion

The results confirm the findings of previous meta-analysis (Ma, 2006; Rose & Lin, 1984; Scott et al., 2004) indicating that creativity training is effective (d = 0.81, r = 0.35) on adults. The magnitude of this finding indicates creativity training is promising for increasing adults' creative thinking. However, because of the scarcity of available literature, this result implies that more efforts need to be made to bring creativity into adult classrooms.

The majority of selected studies used idea-generation (divergent thinking) strategies for facilitating adults' idea fluency (quantity). The outcome measurement shows the positive direction of this kind of implementation. In this study, CPS was the most popular intervention in adult classrooms and the concept of TTCT (Torrance, 1974) was utilized to assess the effect of intervention. Indeed Puccio, Firestien, Coyle, and Masucci (2006) provided an excellent example of review and synthesis of the CPS literature in organizational settings. They discovered the positive benefits of the CPS training in adults groups. In addition, Brophy (1998) reviewed the efforts of CPS in various studies and supported the ideal of "the likelihood that CPS in many situations can be enhanced by targeted training" (p. 144).

In order to maintain the validity of this meta-analytic study, the researcher carefully scrutinized all included studies for the check of sample size, control group, published, and the measurement tool. The sample sizes of studies are adequate (from 36 to 174 subjects) with the control group. All articles were either from peer-reviewed journals or from unpublished dissertations. The majority used TTCT as the assessment tool. In terms of assessment of creativity, the results of the current study indicate that fluency, flexibility, and originality might be the valid assessment of creative performance, with the medium effect size. The effect size of elaboration was trivial. This implies for the future researchers to reconsider the assessment of elaboration as an indicator of creativity. In addition, the use of attitude as a benchmark of creative performance is questionable because the small effect size was found in this study. It is probably the economic issue; thus, the majority of studies utilized the paper-and-pencil

divergent thinking tests as the main criteria for the evaluation of creativity.

It should be noted that although divergent thinking tests (e.g., TTCT) enjoy well-known reputation in creativity research, several researchers have questioned the validity of this kind of test (e.g., Houtz & Krug, 1995; Runco, 2006). The major deficiency is grounded in the lack of validity. In other words, this paper-and-pencil assessment does not guarantee real-life creativity. In order to address this issue, for future research, it might be helpful to use different approaches to evaluate the creative performance of adults. For instance, ask adults to create real-life products (e.g., poem, story, and collages) and have a panel of judges evaluate their creativity in terms of artifacts. This line of research was developed by Amabile (1982, 1996) who used the Consensual Assessment Technique (CAT) procedure to detect creativity and was further extended by other researchers (Garoff & Besancon, 2008; Kaufman, Bear, & Cole, 2009; Kaufman, Lee, Baer, & Lee, 2007).

One shortcoming of this analysis should be noted. Because only 11 studies were found, the small sample size does not have enough power to generalize the real effect of creativity training in adults. Therefore, these findings cannot be considered conclusive. Additional carefully designed research is needed. Despite this notable limitation, it still encourages practitioners to consider the use of creativity training in adult learners. Above all, the question about the real effect of training cannot be fully and finally answered given the current state of the literature, but practitioners should consider the possible beneficial outcomes of using imaginative, explorative, play, and constructive approaches to unleash the creativity of adult learners.

6. Conclusion

In the adult learning context, the idea of creativity development of adults still needs more attention. Despite a plea by several adult educators to promote creativity (e.g., Edelson, 1999; Hickson & Housley, 1997; Lones, 2000), few studies have focused on this specific group (Butler, 1967; Haanstra, 1999; Nemec & Sullivan-Soydan, 2009). What remains to be explored are appropriate and beneficial approaches that adult educators can utilize to facilitate creativity in adult learners. It is, therefore, the major focus of this meta-analytic study that encourages more educators to search and implement creativity training to unleash creativity seeds in adult learners.

One implication from the current study is that adult educators should invest creative potential. Adult educators are aware of the importance of creativity in adult learners (Edelson & Malone, 1999; Lones, 2000). After reviewing related literature about creativity and age, Simonton (1990) believed the notion that “creativity is the prerogative of youth, whereas old age is virtually synonymous with a decline in creative power” (p. 626) is problematic. Creativity is one of the important elements in successful aging. In fact, creativity offers a channel to cope effectively with major life changes, especially age-related physiological and functional declines (Flood & Scharer, 2006). Specifically, modern challenges necessitate the adoption of a new way of thinking, where creative problem-finding and solving plays a key role (Fontenot, 1993). The value of stimulating creativity in elders is to improve functioning at all levels (Sierpina & Cole, 2004), especially in the area of mental health (Cropley, 1990).

Runco (2007) stresses the value of studies of creative potential and has an optimistic view of this creative potential.

In summary, it is suggested that adult educators rethink to bring some creativity training tactics into their curricula and practice these exercises to promote creative thinking for adult learners. In addition, for policy makers, it is suggested that the idea of creative thinking in adults should be valued and in turn provide adequate resource and support to buttress this idea.

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