THE EFFECTIVENESS OF THE CREATIVE REVERSAL ACT (CREACT) ON STUDENTS' CREATIVE THINKING: FURTHER EVIDENCE FROM TURKEY

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ABSTRACT
CREACT is a teaching tool that was developed based on the Janusian process and it can be used to improve students' creative thinking performance. Depending on the evidence of previous research which was carried out in language arts, it is found that CREACT is effective in improving students' creative thinking abilities. The purpose of this research study was to investigate the effectiveness of CREACT on students' creative thinking in drawing arts. The one group pretest-posttest design was used to carry out this research study. Nine lessons, including nine different concepts for each lesson, were designed and instructed by using CREACT during students' free time activities classes in a three week period. Participants were twenty-three 5th grade students from a public primary school. Findings indicated that CREACT is effective on developing students' creative thinking performance in drawing arts.
Keywords: Creative thinking, CREACT, the Janusian process

INTRODUCTION

A variety of definitions of creativity exists; the characteristics of creative individuals as well. Although creativity was created via questioning ability of mankind, the term creativity has been one of the most complex issues to be clearly defined till its creation. The world is full of similar, overlapping, and possibly synonymous terms (e.g., imagination, ingenuity, innovation, inspiration, inventiveness, muse, novelty, originality, serendipity, talent, unique), and definitions of each term vary widely (Plucker & Makel, 2010). However, it is possible to find terms like ability, reaction, capacity, process, person, product, uniqueness, novelty, etc. in most definitions of creativity. Authors of this article believe that the term creativity is quite much likely to be accepted as the ability of producing new ideas and/or products that are novel and/or unique and also useful and appropriate in any specific domains.

On the other hand, apart from creativity definitions, developmental issues in one's creative ability are quite crucial as well. To improve one's creative performance, it is believed that supporting him/her with enriched instructional environments and challenging strategies and/or tools for improving creative ability are particularly essential. In addition, this support can easily be related to some of the main research questions or research problems which have been arising in the literature of the domain of creativity. Naturally, the domain of creativity research creates its own questions that lead to an approach of questioning the most problematic issues in the domain. In addition, it is expected that a number of domain specific research questions on creativity will vary: revealing historical development, conceptions, definitions, measurement and assessment and improvement of creativity. Nonetheless, those varieties of questions are mostly related to humans, especially children and/or students.

One of the first questions to be addressed regarding creativity in children is whether or not children can actually be creative (Russ & Fiorelli, 2010). It has already been pointed out that there is a common way of thinking about creative acts: the concept of "Big-C" and "little-c" creativity (Richards, 2001). Simply, Big-C creativity requires significant contributions and discoveries in a domain, whereas little-c creativity can be considered as a novel, useful product or idea which has no great contribution in a particular domain. It is generally accepted that children's creative performance corresponds to little-c creativity. However, the question remains whether it is possible to shift children's little-c creativity level to Big-C creativity level? Research suggests that children are able to be creative, in the sense that they are able to come up with novel ideas in the context of their age and abilities (Russ & Fiorelli, 2010). From this point of view, the aim of the authors of this article is to address the question, whether or not creative performance can be developed.

A variety of methods, approaches, techniques and tools exist for the development of students' creative performance. Nickerson (1999) emphasizes that in most cases, direct and compelling experimental evidence of their effectiveness is lacking and continues that the likelihood that they will work, if used with good judgment, is high, and the chance they will do harm is small. This point also clarifies the significance of this research study. The main focus of this article is to show further evidence on the effectiveness of a new teaching tool named Creative Reversal Act (CREACT) on students' creative performance.

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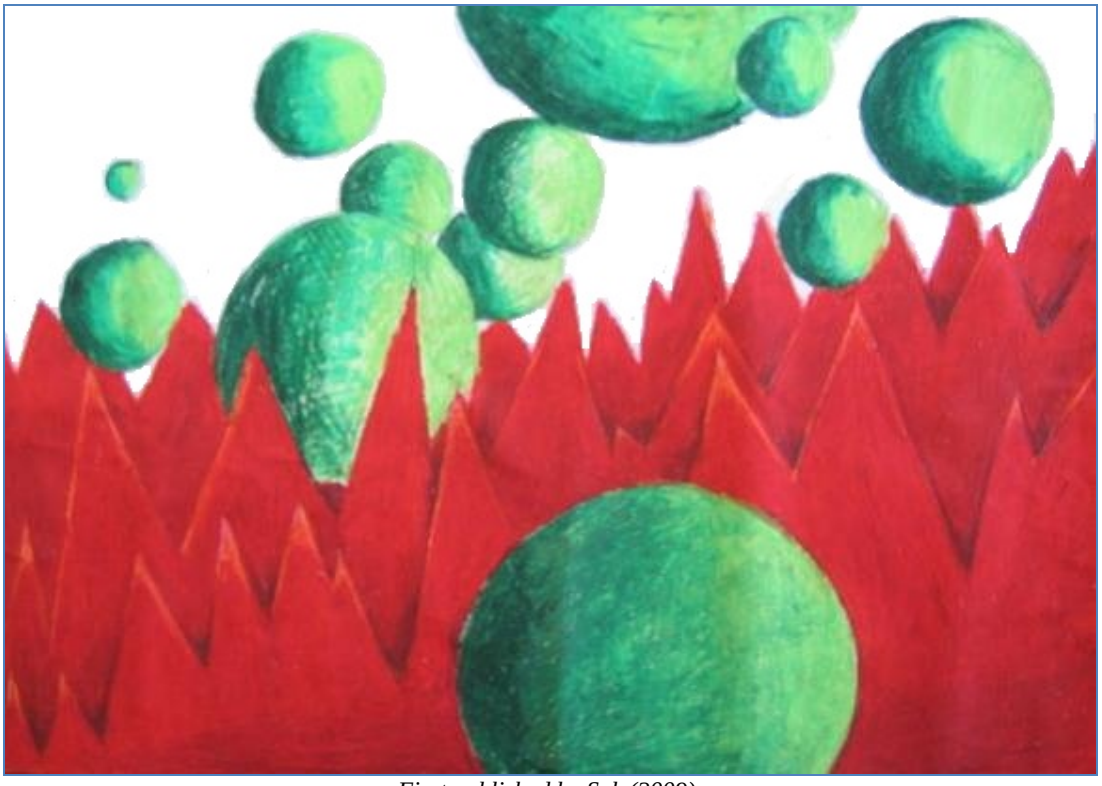
In this article, the aim of the authors was to present CREACT itself, its theoretical background and a recent experimental study on the effectiveness of CREACT on students' creative thinking in drawing arts. CREACT was developed by Sak (2009) based on the Janusian process that was originally operationalized by Rotenberg (1971). The Janusian Process, CREACT and its steps are reviewed below.

THE JANUSIAN PROCESS and CREACT

The Janusian process is defined as actively conceiving multiple opposites or antitheses simultaneously (Rothenberg, 1996). The term used for this process derives from the qualities of the Roman god, Janus, who had faces that looked in multiple (2, 4, or 6) diametrically opposite directions simultaneously (Rothenberg, 1999). Simply, the aim of this process is to develop opposite ideas in a given theory or concept and to construct new ideas by putting previous concepts and new concepts together simultaneously. This process stipulated that there were four phases: 1) *motivation to create*, which means the knowledge of important themes that lead a specific motivation to create, to produce something both new and valuable; 2) *deviation or separation,* which means one or both of the oppositional elements to be brought together are focused on or identified; 3) *simultaneous opposition*, which means pairs, sets, or series of opposites are simultaneously brought together in a conception that leads directly to the creative outcome; and 4) *construction,* which means modification, elaboration and application innovative insights and formulations (see Rothenberg, 1971; 1996). The painting in Figure 1 can be considered as an example of how Janusian process can be applied and influence a product in drawing arts.

FIGURE 1. Painting was painted by one of the authors of this article on the basis of the Janusian process. It represents a number of oppositions, contrasts, symmetries in shapes, colors (type, darkness), upside down views etc.



First published by Sak (2009).

CREACT was developed based on the Janusian process (Sak, 2009). Although the Janusian process has four phases, CREACT consists of five steps. These steps are: construction, segregation, opposition, combination, and elaboration (see Table 1). Brief explanations of each step are following: The purpose of the first step named *construction* is to stimulate students' interest and curiosity and raise their motivation about a particular concept or topic, and to help them learn more about it; thereby enabling students to heighten and/or construct motivation and knowledge to be able to produce creative results. The purpose of the second step named *segregation* is to identify critical thematic elements of the concept, theory or thesis discussed in the first step. The purpose of the third step named *opposition* is to identify or formulate opposites of the thematic elements identified in the

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segregation step. The purpose of the forth step named *combination* is to bring simultaneously together the element(s) separated out in the second step and the opposites of these elements identified or formulated in the third step. The purpose of the last step named *elaboration* is that the configuration of simultaneous conception is revised and elaborated in a way the new conception sounds original even if it looks self-contradictory in meaning or retains converse structure (see Sak, 2009). Table 1 presents a detailed discussion form of CREACT including its steps, focus questions and actions. And also a clear example can be found at the appendix I which was produced by one of the authors of this article focusing on the concept "war".

TABLE 1. CREACT Discussion Form

Steps		Focus Question	Behavior/Action
1.Construction		What do we know about this theory, idea, or concept? What are the uses of it for us? What else should we know about it?	Explore the theory from multiple perspectives.
2.Segregation	a) Segregate the concept into components	What are some components of this theory, idea, or concept? What makes this theory, idea or concept?	Identify and separate out major components of…
	b) Segregate components into elements	Can we separate out this component further? What are some elements of this component?	Identify and segregate distinct elements of a component.
3.Opposition		a. What is the opposite(s) of this element/component? b. How are they opposite to each other on a scale/category/plane/space? c. How is this opposite you just have identified as valid/true as its opposite?	1. Generate opposite(s) of each element. 2. Evaluate specificity of opposites. 3. Determine whether opposites are as true as previous ideas.
4.Combination		a. Which opposites can be used together in a new conception? b. Why can these opposites go together in a new conception?	Identify whether two or more opposites can be used together in a new conception.
5.Elaboration		a. How is this new conception comprehensive enough to sum up the entire dimension of the new conception? b. How does the new conception possess symmetry? c. In what ways can we revise this new conception?	Evaluate whether the opposites hold symmetry, specificity and sum up the entire dimension of the new conception.

Adapted from Sak (2009)

PREVIOUS RESEARCH

The effectiveness of CREACT was previously investigated by Sak & Oz (2009). This single research study was carried out with students from a social sciences high school. It was a one group pretest-posttest design and the treatment process took 3 weeks including 6 lessons using CREACT. Students' creativity was pre and post-tested via 3 tasks: a poem task, a story task and a paradox (es) task. It was found that CREACT improved students' creative performance significantly on the poem and story tasks, but had a low effect on their creative performance on the paradox (es) task. Overall findings of this research study showed that CREACT is useful for developing and improving students' creative thinking.

PURPOSE of the STUDY

The purpose of this research study was to investigate the effectiveness of CREACT on students' creative thinking in drawing arts. The question that was written below is the simple research question of this research study.

- How much effective is CREACT on improving students' creative performance in drawing arts?

In addition, hypothesis which were planned to be tested, derived from the research question and given below.

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- $H_{0.I}$ = There is no significance of difference between experiment group statistic and population parameter.
- $H_{0.II}$ = There is no significance of correlations between subtasks and main task scores.
- $H_{0.III}$ = There is no significance of difference between pretest and posttest scores.
- $H_{0.IV}$ = There is no interaction between gender and pretest scores.
- $H_{0.V}$ = There is no interaction between gender and posttest scores.

METHODOLOGY

STUDY GROUP

26 students from a 5th grade class of a public primary school attended this research study and were taken pretests. The public primary school was located in a suburban area of Eskisehir, Turkey. Depending on standardized achievement test scores, this school's achievement performance was almost average among all public primary schools in Eskisehir. Most of the students' families were at low socio-economic status. Finally, a total of 23 students completed both pretests and posttests. %52.2 (n=12) of the students were boys and %47.8 (n=11) were girls. All of the students' mean age was 120.95 months with a minimum of 115 months and a maximum of 127 months. The age range was 12 months.

Fraenkel & Wallen (2006, p.269) stated that one of the essential characteristics of experimental research is random assignment of subjects to group(s). The subject group of this research study was not randomized because there was only one group of students which was convenience for the study. Yet, it has to be considered that it is almost impossible to create a group by randomization in public schools. By the way, authors of this article believe that when students are being enrolled in a public school, they frequently have almost equal chances to attend in any classrooms.

RESEARCH DESIGN

The one group pretest-posttest design was used to carry out the research study. The dependent variable of this study was students' creative performance and the independent variable was CREACT. It took 3 weeks for the treatment process. Pretests and posttests were performed during two days period before and after the treatment process. Nine lessons, with different concepts for each lesson, were planned and instructed using CREACT during students' free time activities classes. The concepts were play, technology, education, arts, examination, talent, money, freedom and media. These lessons were carried out three times a week once every two days after one lesson. The classroom teacher was trained in CREACT and the research process over two sessions. After the training, she guided the pre-planned lessons with CRAECT to his/her own classroom. Also, the teacher was asked to collect the activity forms of students after each lesson and all of those activity forms were checked by the authors. CREACT is a kind of self-actualized activity and students are independent during CREACT discussions.

INSTRUMENTATION

The testing instrument consisted of three subtasks: conceptualization, drawing and painting. Students were asked to conceptualize, to draw and to paint a painting on a given concept. The given concept was "future". Conceptualization, drawing and painting were the subtasks of the main task. In each subtask, students were given an instruction whereby they had to perform each subtask using as many as oppositions and/or paradoxes as they could have. During the test, students were completely independent in taking the subtasks in any order. Total time for testing was 60 minutes for each student. The reliability coefficients of pretest and posttest were .92 and .88 (Cronbach's Alpha). These reliability coefficients indicated that both pretest and posttest had a high reliability.

DATA ANALYSIS

Initially, students' drawings were examined by two art teachers and two authors of this article. For each subtasks, scores were decided upon as to probable categories from which quantitative data from pretests and posttests could be derived. 4 categories for the conceptualization subtask, 8 categories for the drawing subtask and 4 categories for the painting subtask were determined. Students' pre-tests and post-tests were scored via the categories for each subtask. The scores that were derived under the categories were calculated based on three types of scores: fluency, flexibility and creativity. Fluency is operationally defined as the number of responses to a given stimuli (Runco, 1999, p.577). The fluency score means true usage of oppositions and paradoxes. Flexibility is operationalized as the number and/or uniqueness of categories of responses to a given stimuli (Guilford, 1968, p.99). Flexibility scores were calculated via log_2 formula from fluency scores. The sum of fluency and flexibility scores forms the creativity score. For each test, the sum of the three subtasks' creativity scores was used as a total creativity score to compare the mean differences between students' pre-test and post-

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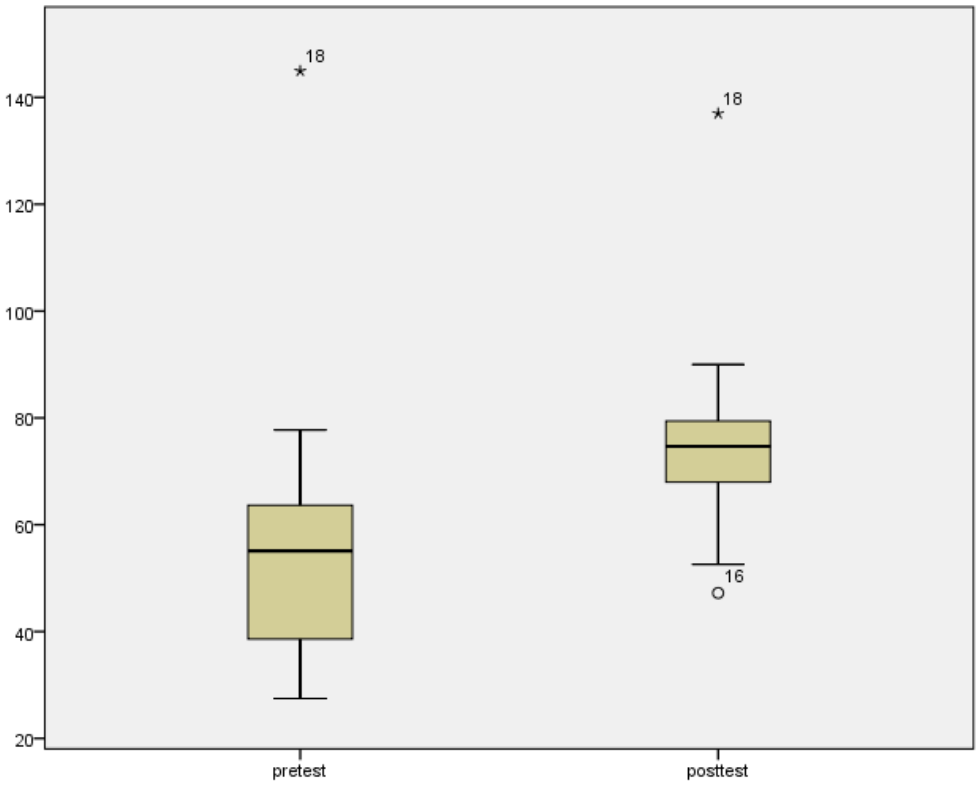
test scores. Two authors of this article scored both pretests and posttests. The inter-rater reliability coefficients were .93 for the pretest and .92 for the posttest. These coefficients indicated that there was a strong consistence between two art teachers' scores.

There were 26 participants in this study at the beginning. After checking the eventual data, it was seen that 2 of the students had not taken the posttests. Those 2 students were taken out of the research group. Besides, it was seen that one student (number 18) scored extremely high in both pretest and posttest (see Figure 2). That student was behaved as an outlier and taken out of the research group. The total subject number was 23.

FIGURE 2. Boxplots of pretest and posttest scores



Correlations among subtasks and the main task were calculated to determine whether or not the usage of total creativity scores would be reliable. To test the assumption of normal distribution, the Shapiro-Wilk Test was run for both pretest and posttest scores. To compare the mean differences of pretest and posttest scores, Paired Samples T-test was run. Mean scores, standard deviations and effect size, were calculated. To control the internal validity, the interaction effect between students' gender and CREACT was checked using the One-Way MANOVA. For all of the statistical analysis, SPSS 20.0 was used and procedures that were suggested by Pallant (2011) were followed.

FINDINGS

ASSUMPTION of NORMAL DISTRIBUTION

It has already been stated that the sample size of the group was 23 (less than 30), therefore, it was checked if the distribution was normal or not. The Shapiro-Wilk test results indicated no violation of the hypothesis of $H_{0.I}$ and statistics also supported that the distribution was normal ($p=.474$ for pretest, $p= .140$ for posttest, $df=23$, $p>.05$).

CORRELATIONS among SUBTASKS and MAIN TASK

Table 2 presents the correlation coefficients among subtasks and the main task. Correlation coefficients among subtasks varied from .09 to .64 and all coefficients were found significant except painting subtask and drawing subtask. However, correlation coefficients between subtasks and the main task varied from .65 to .88 and all coefficients were found to be significant. Therefore the hypothesis of $H_{0.II}$ was violated. From this point, the sum of subtask creativity scores were used as a main task creativity score for each subject.

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TABLE 2. Correlations among Subtasks and Main Task

	Drawing Subtask	Painting Subtask	Conceptualization Subtask	Main Task
Drawing Subtask	1			
Painting Subtask	.09	1		
Conceptualization Subtask	.49*	.64**	1	
Main Task	.78**	.65**	.88**	1

* Correlations are significant at .05 level;
** Correlations are significant at .01 level

COMPARISON of STUDENTS' CREATIVE PERFORMANCE on MAIN TASK

As seen in Table 3, the number of students who took both pretest and posttest was 23. The students' pretests mean score was 52.32 with a standard deviation of 14.56 and the posttests mean score was 71.95 with a standard deviation of 10.20. The mean difference between pretest and posttest mean scores was found to be significant, t (22) = -7.51, p<.001 and the hypothesis of $H_{0.III}$ was violated. The mean increase in creativity scores was 19.63 with a 99.9% confidence interval ranging from -25.1 to -14.2. The magnitude of the effect size of the mean difference between pretest and posttest mean scores was calculated as .71. Cohen (1988) suggests that .01=small effect, .06=moderate effect and .14=large effect. The effect size of .71 indicated a large effect.

TABLE 3. Pretest and Posttest Mean Scores, Standard Deviations, T-Test Results and Effect Size

Measures	N	$\overline{X}$	SD	t	df	p	Eta² (d)
Pretest	23	52.32	14.56	-7.51	22	.000	.71
Posttest	23	71.95	10.21				

p<.001

To control the internal validity of this research study, some procedures were followed. First, to control the implementation threat, an 11 itemed self-checklist designed by the authors was used by the classroom teacher during the lessons which were carried out using CREACT. Second, to control the interaction effect on students' gender, significance of mean differences for pretest and posttest scores were analyzed by running the One-Way MANOVA. After assumption testing for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multicollinearity; no serious violations was noted. Consequently, the ONE-WAY MANOVA statistics indicated no violation of hypothesis of $H_{0.IV}$ and $H_{0.V}$ which concluded that no significance of differences between boys' and girls' pretest and posttest mean scores (F (2, 20) = .80, p= .46, Wilk's Lambda= .93) were found.

DISCUSSION and CONCLUSIONS

In this article, the effectiveness of CREACT on students' creative thinking was presented. Findings showed that CREACT improved students' creative performance and the calculated effect size was large. This finding supports the previous research findings of Sak & Oz (2009). From this point, especially in classroom environments, discussions with CREACT can be conducted and this will help to develop students' creative performance and creative thinking.

Assuming that most people have some creative potential and have some high-level potential, the next question is how to evoke, access, stimulate, train, or develop the creative potential (Feldhusen, 1995). Most researchers are quite certain that creativity can be taught and/or improved. And it is possible to state that a crucial need of evidence in developing the creative ability is essential, especially teaching creatively. However, one can teach students more creatively (Sternberg & Williams, 1996; Williams, Markle, Brigockas, & Sternberg, 2001; Sternberg, 2006). And one way to succeed in teaching creatively can be the tool named CREACT.

A controversial issue in developing creativity is long term versus short term interventions effect in changing creativity. It is asserted that changes in creativity occur over long periods of time (Runco & Pezdek, 1984). Reversely, there is evidence on the effectiveness of some short term interventions on the development of creativity. This experimental research study was one similar to those short term interventions and supported the idea of short term interventions can also be effective in changing creativity positively.

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By the way, it has to be considered that the purpose of CREACT was not to teach students how to draw or paint, but to develop their thinking skills through the Janusian process (Sak & Oz, 2009). In this research study, authors only examined the opposite and paradoxical conceptions included in the Janusian thinking process, via concepts, painting and the figures that they drew. Also, findings proved that children's conceptualizations included oppositions and paradoxes which they developed by the process and by the implication of CREACT. Thus, the question as to whether creativity can be developed was confirmed by the findings of this research study. Furthermore, as Nickerson (1999) stated that direct and compelling experimental evidence of the effectiveness of creativity developing strategies is lacking; so, this study made a contribution to dispel this lack.

In addition to everything, it is possible to discuss that creativity fostering teacher behaviors are also crucial to encourage students' creative ability. The teacher can also indirectly influence student creativity by creating a supportive social environment through her words and deeds (Soh, 2000). From this point of view, using the tool CREACT can possibly be a part of classroom environment and can help in improving teachers' creativity fostering behaviors. Additionally, a research aimed on the effectiveness of CREACT on teachers' creativity fostering behaviors is strongly recommended.

Last but not least, there are some limitations to this research study. This current research and the previous research were both one group pretest-posttest designs. This type of experimental research was frequently classified as weak experimental designs or pre-experimental designs. Results could be more acceptable and reliable if a further research on the effectiveness of CREACT on students' creative performance is conducted with a control group and a random assignment. So, authors of this article also suggest an experimental research with a control group and a random assignment, which focuses on the effectiveness of Janusian process and CREACT on developing students' creative performance.

To sum up, there are many factors that contribute to one's creativity and the developmental process of his/her creativity or creativities; but perhaps there is more than one kind of creativity (Sternberg, 2005). When developing creativity, we can develop different kinds of creativity, ranging from minor replications to major redirections in thinking (Sternberg, 2006). In classroom context, flexible and effective teaching tools are much likely to be accepted as one of the most crucial factors as a contributor for developing a variety of creativities. A flexible and effective teaching tool called CREACT has the potential to improve students' creative performance and creative thinking, perhaps from different aspects. The authors of this article previously experienced that CREACT is flexible enough to be implemented in a variety of lessons and topics. Evidently, this new technique can be considered as a useful teaching tool to develop students' creative thinking. It is recommended to teachers and/or trainers that CREACT be used in the classroom or in any kind of teaching environments.

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APPENDIX 1: A Sample Output of CREACT

<table>
<tr><td colspan="2">Concept= WAR
Step I
Construction
What does “war” mean to you?
War is fighting each other.
War is killing of people.
War brings life itself.
War is a confliction.
War is nonsense.
War is a necessity.
War is a crime.
War brings peace itself.
War sheds blood.</td></tr>
<tr><td>Step II
Segregation
What constitutes “war”?
War is arming.
War is enslavement.
War is heroism.
War is a separation.
War brings death itself.
War is a massacre.
War is a blood shed.</td><td>Step III
Opposition
What are the oppositions of the elements that you’ve written on step II?
War is disarming.
War brings freedom itself.
War is a cowardliness.
War is unification.
War brings life itself.
War is saving lives.
War is a binding up wounds.</td></tr>
<tr><td>Step IV
Combination
Which oppositions can be used to redefine the term “war”?
War is the heroism of cowards.
War brings death instead of life itself.
War is an enslavement of freedom.</td><td>Step V
Elaboration
How can we change this new concept?
War is the heroism of cowards who bring death in lieu of life itself thereby enslaving the freedom of mankind.</td></tr>
</table>

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