

POSSIBILITIES OF KNOWING AND DEVELOPING THE CREATIVE POTENTIAL OF STUDENTS

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Abstract

From a theoretical perspective, the study undertakes a synthesis of the main aspects that currently delineate the phenomenon/issue of creativity: conceptual delimitations, models of approaching creativity, creativity stages and levels of creativity, methods and devices for creative learning. On this basis, we have designed an applied research that aimed at the following objectives: to know the initial development level of students' creative potential; to apply some creative learning strategies in order to develop students' creative potential; to evaluate the progress made by the students during and at the end of the formative training. The research has been conducted by using several methods and instruments: the psycho-pedagogical experiment and the Test of productive creativity. The analysis of the data obtained during the research confirms the general hypothesis and the specific hypotheses regarding the efficiency of the formative training that has been designed and developed for primary school students. There have been emphasized formative values of the didactic activities and strategies used, which have focused upon diagnosing and developing the creative potential of each student. Research data can be turned to profit in optimizing the didactic activities with primary school students, through the promotion of some methods and procedures of creative learning, as well as in the activities for teaching staff professional training.

Key words: creative potential, heuristic didactic strategies, creative learning, formative training

Introduction

One of the key issues of the research conducted in the last decades in the fields of psychology and education sciences is creativity. Creativity continues to be a main concern of researchers, not because the efforts made so far have been fruitless, but because the creative potential represents

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one of the most complex “riches”, and its education in order to manifest itself through creative behaviours represents one of the most important objectives of contemporary education. Although the number of studies dedicated to this phenomenon has risen vertiginously, the concept of creativity is not clearly defined, because of the complexity of the creative process and of the diversity of the fields in which creation is involved. The array of definitions spans from the understanding of creativity as an attitude, no matter if the person that has such an attitude elaborates or not a creative product, to the identification of creativity with a creative production of high level, with unusual realizations in different fields.

The studies and research conducted in the field of creativity over the last two decades emphasize the richness and complexity of the approached topic (Amabile 1997; Caluschi, 2001; Cojocariu, 2003; Csikszentmihalyi, 1996; De Bono, 2006; Dumitriu & Dumitriu, 2004; Gardner, 1993; Munteanu, 1994; Partenie, 2005; Roco, 2004; Stoica, 2004; Stoica and Caluschi, 2005).

Some of the papers have focused on emphasizing the need for creativity and the delimitation of this concept in relation to the concepts of talent, aptitude, intelligence, lateral thinking, and divergent thinking. Some psychologists have assimilated creativity with other psychical processes and phenomena: ability, aptitudes, dispositions, intelligence, imagination, divergent thinking (Dumitriu and Dumitriu, 2004). Thus, creativity has been considered a style of learning, a form of intelligence or a form of divergent thinking (Guilford), a fluid capacity of unprecedented associations (Mednick), attraction toward complexity (Barron), aptitude that is full of mental energy and a projection in an activity that consumes this energy (Radulescu-Motru), a general personality trait, a disposition of the person towards novelty, a certain organization of the processes in a personality system (Allport), a psychic capacity of human beings to generate the new, to elaborate new ways and original solutions to solve problems and to express themselves in personalised ways (Popescu-Neveanu). Creativity appears as a synthetic expression of the psychological internal conditions (processes, attributes, states, operational, aptitude and motivational structures) that generate the new (Dumitriu and Dumitriu, 2004, 1961-1962); the aptitude to generate original and efficient systems starting from existing elements (Munteanu, 1994, 1970). Other papers have focused on the analysis of different theories and paradigms of creativity (associations, configurations, psychoanalytical, existentialist, interpersonal or cultural, neuro-bio-psychological, pragmatic, psychometrical), on approaching creativity as a process, as a product, as an essential dimension of personality, as creative potential. The following aspects have been analyzed in-depth: the stages and the levels of creativity, the relationship between

inspiration and creativity, motivation and creativity, the stimulating and inhibiting factors of creativity, the blockages of creativity, personal complexes etc.

It has been proven that educating creativity represents the practical test of the level of education sciences, because the creative behaviour is the most complex behaviour. It is multileveled, in the sense that it can extend from the mere transformation, through a personal effort of some individual means of action, to the groundbreaking revolution of the entire human knowledge. At the same time, the education of creativity, the formation of a creative proactive personality, endowed with projective and anticipatory abilities, has become a goal in many educational systems. The problem of transforming the creative potential into a personality trait remains a controversial one. Some researchers consider that the creative potential has a self-propulsive force, which actualizes itself in time, its evolution not being influenced by the environment or by education, which would only intervene in the realization of a permissive atmosphere (Skinner). Other researchers consider that the creativity level depends only on the quality of the creative actions, because creativity is learnt, even if it is not learnt as Physics or like carpentry. “It would be more appropriate to say that it unleashes itself or that it develops” (Schwartz, 1976, p. 183, apud Caluschi, 2001). It has also been stated that, through specific educative actions, the creative potential can be developed in a field (in general, in the artistic field) and then it can be transferred.

The educational practice, the direct and long-lasting contact with the students, the spontaneity and the novelty of the answers, the blending of the real and the imaginary have determined us to ask ourselves: to what extent and through what strategies can the creative potential be stimulated at the age at which the bases of personality are laid? Can the child be instrumented at an early age with generative operations, by stimulating development needs, cognitive and aesthetic motivation, as well as epistemic curiosity?.

2. Research design

2.1. Research hypothesis and objectives

In this research we have formulated the following *general hypothesis*:

The design and development of a didactic approach, centered on applying strategies of creative learning to the subject of Mathematics will contribute to developing the creative potential of the students and to increasing their school performance.

Specific hypothesis 1: The systematic use of creative learning strategies in Mathematics will contribute to the development of the creative potential of the students.

Specific hypothesis: The systematic use of creative learning strategies in Mathematics will contribute to the increase of students' school performance.

In the experimental intercession there were established the following *objectives*:

- to know the creative potential and the level of knowledge and of the Mathematical abilities of the students that participated in the experiment
- to design and employ a didactic approach to Mathematics, through using some strategies of creative learning;
- to monitor and register the students' progress throughout and at the end of the research.

2.2. *Subjects*

The research lot comprises 21 students (class I A), of which 10 are girls and 11 are boys, with ages between 7 and 8 years old, and the research technique was applied to one sample "with measurement before and after".

2.3. *The operationalization of the concepts and of the variables*

The independent variable is represented by the formative program centered on using some creative learning strategies during Mathematics classes. We have operated with the notion of *didactic strategy*, meaning an optimum way of combining learning methods, procedures and means.

The dependent variable is represented by the development level of students' creativity, respectively of school performance. The dependent variable was operationalized as follows: the development level of students' creativity has been evaluated by means of three indicators/criteria: fluidity (the number of the solutions found), flexibility (the variety of the fields), originality (the uniqueness of the solutions); school performance aimed at the students' level of theoretical and practical level of training, that was materialized in the knowledge, acquisitions, abilities acquired in Mathematics, according to the stipulations of the school syllabus.

2.4. *Research methodology*

As research methods we have used: the psycho-pedagogic experiment, the observation, the interview, psychological tests. In order to diagnose the three factors according to which we appreciate creativity (fluency, flexibility, originality) we have applied the Test of productive

creativity (apud Dumitriu, 2004, 2011). The test has been applied to the whole class, between 9.30 a.m. and 10 a.m., considering the biorhythm and the effort curb during the day and during the week.

The students were given a worksheet with circles, triangles, squares and hexagons. In total there are 4 series of 5 simple identical figures. There was formulated the requirement that from each figure to be made a little drawing through the adding and the arranging of the elements. When 80% of the students finished the task, the activity was stopped.

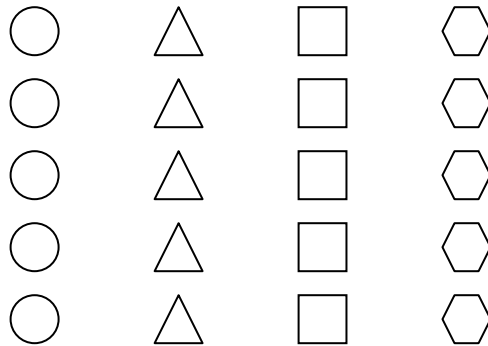


Figure 1. *Productive creativity test*

Scoring:

- fluency – the number of objects that were correctly drawn (1 point each).;
- flexibility – the diversity of the categories, the variety of the fields (1 point for each category);
- originality – unique models create, that appear more than 2 times (1 point) at the level of the sample.

The evaluation test of the school performance has aimed at six objectives to be evaluated (according to the requirements of the syllabus) and comprised 6 items. The correction and the grading have been performed based on performance descriptors, under the form of qualifiers: Very Well, Well, Sufficient and Poor.

The results obtained have been corroborated with the information given by the observations made during the students' testing and during their solving some learning tasks that had a ratio of creativity, as well as with the data provided by the analysis of their activity products.

2.5. Procedure

The sample comprises 21 students (class I A), of which 10 are girls and 11 are boys, with ages between 7 and 8 years old, and the research technique was applied to one sample “with measurement before and after”.

The applied research of experimental type has comprised three stages:

- a. *the initial evaluation stage* that took place at the beginning of the experiment, in which there have been applied evaluation tests for the creative potential, as well as for the students’ knowledge, skills, mathematical abilities;
- b. *the formative-ameliorative stage*, has expanded over five months and has included the application of a didactic approach to Mathematics through using creative learning strategies;
- c. *the final evaluation stage* that took place at the end of the experimental research and consisted in retesting the students in order to know the progress made in terms of creativity and school performance, as a consequence of introducing the “progress factor”.

The development stages of a lesson based on the creative didactic strategy have been structured as follows:

- the creation of a problem-situation related to the lesson or the achievement of creative associations regarding a Mathematical term in the stage of “capturing the attention” (*problematization*);
- the formation of the skills of creative solving of Math exercises and problems during the training of the students (*the cube, the creative exercise*);
- the solving of entertaining problems during the feed-back (*the didactic game*).

3. Results and discussions

The data have been processed via the SPSS program, version 16.0 for Windows.

The general research hypothesis has been confirmed because the results obtained by the students at the end of the creative learning program are superior to the ones obtained before the program.

The results of Paired Samples Correlations Test (Table 1) indicates a significant correlation between the results obtained before and after the training program centred on applying some

creative learning strategies for Mathematics, as far as the flexibility and originality indicators are concerned.

Table 1. *Paired Samples Correlations*

		N	Correlation	Sig.
Pair 1	Fluency (initial) Fluency (final)	21	.407	.067
Pair 2	Flexibility(initial) Flexibility(final)	21	.520	.016
Pair 3	Originality(initial) Originality (final)	21	.855	.000

The descriptive analysis of the data obtained in initial and final evaluation (Table 2) indicate major differences in the development of the three indicators of creativity at the end of the training program.

Table 2. *Results of paired-sampled test (pre-test and post-test) with 95% CI*

Variables	M_initial	SD_initial	M_final	SD_final	t (20)	p	LL	UL
Fluency (initial) Fluency (final)	19.23	1.26	19.95	.21	-2.75	.012	-1.25	-.17
Flexibility (initial) Flexibility (final)	18.04	1.35	19,14	.91	-4.25	.000	-1.63	-.55
Originality (initial) Originality (final)	.85	1.38	3.23	1.54	-13.55	.000	-2.74	-2.01

Specific hypothesis 1 is confirmed, as it could be observed that there were significant differences between the results obtained before and after the training program centered on developing the creative potential of the participants, regarding the fluency indicator [$t(20) = 2.75$, $p = 0.012$]; flexibility indicator [$t(20) = 4.25$, $p = 0.000$] and originality indicator [$t(20) = 13.55$, $p = 0.000$].

The descriptive analysis of the data obtained in initial and final evaluation (Table 3, Table 4) indicate major differences regarding the level of the students' knowledge and abilities in Mathematics at the end of the training program.

Table 3. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Initial evaluation Final evaluation	21	.86	.000

Specific hypothesis 2 is confirmed, as it could be observed that there were significant differences between the results obtained before and after the training program centered on developing the creative potential of the participants, regarding school performance [$t(20) = 10.42, p = 0.000$]. It has been proven that the systematical use of creative learning strategies in Mathematics contributed to the increase of the students' school performance.

Table 4. Results of paired-sampled test (pre-test and post-test) with 95% CI

Variables	M_initial	SD_initial	M_final	SD_final	t (20)	p	LL	UL
Initial evaluation	62.14	12.33	77.66	13.39	-10.42	.000	-18.62	-12.41
Final evaluation								

Therefore, applying creative learning strategies has made a contribution to a solid assimilation, the consolidation of Mathematical knowledge and abilities, as well as their creative use to solve different tasks and problems. The experimentation of the module of Mathematical didactic activities meant improving the work methodology through the introduction of didactic strategies that aim at active learning, creative on its own (progress factors in our experiment). There have been solved a large variety of creative Mathematics exercises and problems, related to the class level, respecting the school syllabus.

Conclusions

The research findings and results have validated the efficiency of the creative training program that was designed and employed with the students for the school subject of Mathematics. At the end of the experiment, the results obtained by the participants are superior to the ones from the initial evaluation, in terms of creative indicators (fluency, flexibility and originality) and of school performance indicators (knowledge, skills and abilities).

The research data coincide with the ones emphasized in literature in this field (Amabile, 1997; Caluschi, 2001; Cojocariu, 2003; Csikszentmihalyi, 1996; De Bono, 2006; Dumitriu & Dumitriu,

2004; Gardner, 1993; Munteanu, 1994; Partenie, 2005; Roco, 2004; Stoica, 2004; Stoica & Caluschi, 2005; Sternberg, 2005).

The students prove a high creative potential that is specific to their age. At this age, their fantasy is unlimited, their imagination is free and uncensored. The creative students have proven an unusual ability to pick up and to store information, being more fluent in exploring the stored knowledge and in producing associations between them. During the Maths lessons, the activity of problem solving and composing has rich formative potential, being one of the main ways of developing students' independent and original thinking.

The use of modern methods of teaching Mathematics, of heuristic procedures, has a more efficient formative character that materializes in the development of superior intellectual abilities and of aptitudes that are specific to the creative act. In the education of creativity, an important role is attributed to the relationship between the teacher and the students, the open and receptive attitude towards them, the creation of an atmosphere of cooperation and encouragement. The methods and procedures used to measure and develop the students' creative potential determined an increase of school performance, as well as a slight increase of the pace of rhythm of students' work, but mostly they contributed to the formation of a divergent way of thinking.

The above mentioned literature, as well as educational practice, mentions some directions of action in order to develop students' creativity:

- to adopt an adequate attitude in the relations with the students, meaning that the teacher should not repress the creative manifestations and development;
- to intervene consciously and actively in order to dismiss the subjective and objective blockages of creativity;

To process and develop, in an organized manner, the creative potentiality of each pupil, in order to facilitate their full development and valorization.

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