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THE ROLE OF CREATIVITY IN THE DEVELOPMENT OF METACOGNITIVE SKILLS IN PRIMARY SCHOOL

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Abstract

One of education's main purposes is to prepare the children for the post-school life, to help them gather mental, emotional, social, and strategical resources. The process of creativity is a process that regularly outputs original and valuable ideas, which once developed among scholars, allows them to experiment, to research, to ask questions and to acquire the skills and dispositions of genuine thinking. The metacognitive process is one of the most important processes which we daily use, some of us fully aware of it and some of us completely unaware. This helps us to resolve either educational assignments or life duties in general. Unfortunately, the educational process isn't putting great accent on creativity and metacognition, although they have a significant role in learning, solving problems and task fulfilment. Metacognition, as known as the competence of learning to learn, is made up of a skills, abilities and attitudes collection, which were developed in a specific context and in a reflexive and strategic manner which includes cognitive, metacognitive and non-cognitive resources towards active and interactive engagement in learning and efficient task resolution. The purpose of this study was to develop an educational intervention programme based on creativity to develop the metacognitive skills among the pupils from the primary school. The results proved the programs' efficiency by increasing from a low level to a high level of creativity.

Keywords: Creativity, development, educational intervention program, metacognition, pupils in primary school

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1. Introduction

Cognitive psychology defines metacognition by “the knowledge that the subject has about the functioning of his own cognitive system and which can optimize its functioning” (Miclea, 1999, p. 323).

“Metacognition refers to the body of knowledge and reflections on how cognitive activity works and how the executive functions that regulate such functions are engaged” (Corno, 2001, as cited in Mih, 2010, p. 333). If cognition helps the subject to solve a certain task, metacognition ensures the supervision of the resolving process and at the same time ensures an adjustment of the steps necessary to accomplish that task (Slife & Weaver, 1992, as cited in Mih, 2010).

Mih (2010) considers that metacognition is one of the most important components of the human cognitive system. Cognitive level cannot be fully understood in the absence of a good representation of metacognitive functioning, respectively of the knowledge we have about how mental mechanisms and processes work such as: memorization, understanding, attention, reasoning, problem solving. In other words, this metacognitive knowledge is: reflections on one's own cognitive activity (knowing how to learn or distinguishing between memorizing a material and understanding it) and anticipating the possibilities of exploiting those reflections.

After analyzing several definitions, Mih (2010) states that “metacognition refers to a person's ability to represent his own cognitive activity and also the ability to control, evaluate and exploit the results of this representation” (p. 334).

Stoica-Constatin (2004) defines creativity in one of his works:

> As a complex, unitary and dynamic phenomenon, which engages the entire human personality, involving the bio-psycho-social and cultural structure of the personality and certain external factors to achieve the highest form of manifestation of human behavior, finalized by the production of the new with social value, be it concrete or abstract. (p. 93)

In addition, in Wallace et al. (2013), creativity:

> Is the ability to think, develop, and implement new ideas and solutions, or to bring unusual ideas together in a new way. Creative ability can result in a personal creative idea or product, as is often the case with young children, or in an idea or product that is universally new, as is the case with older and older students. Creative thinking is a key element in problem solving. (p. 18)

According to Mih (2010), a number of factors have been identified that have an inhibitory effect on children's creative behavior. They were divided into three categories:

A. The first category includes certain characteristics of children and can take the form of emotional, cultural or perceptive blockages:

i. Intolerance towards the opinions of colleagues;
ii. Devaluation of self-perception, often marked by signatures such as "I am not a creative person", "I have never done anything special";
iii. Fear of not being ridiculous, of not making mistakes, of not being criticized;

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iv. Dependence on the opinions of others;

B. The two categories are the factors related to the teacher:

i. Behavioral patterns such as: sanctioning for asking uncomfortable questions, premature criticism;

ii. Use by the teacher of phrases such as: "Who knows the correct answer? ", "This is not logical.";

iii. The emphasis is on reproduction and appreciation of originality (here we are talking about two types of teachers: the stimulating ones, which encourage creativity and the lack of enthusiasm, rigid);

C. The third category refers to the education system:

i. School overload;

ii. Dense and organized textbooks.

2. Problem Statement

It is well known that the traditional Romanian education system has limited students' thinking, creativity and more. After many studies and research on the traditional system, it was finally concluded that this system needs to be changed. A change that research shows, but that future generations demand. Thus, education has become an education centered on the student, on his needs. If in the past the student had to adapt to the requirements of the school environment, at present the school had to bend and adapt to the requirements of the student. The activities are done in an integrated way, they are interactive and in a more enjoyable climate and the learning is focused on solving problems. The current system seeks to develop critical thinking through modern methods.

Both creativity and cognition have been pursued over the years in all their forms. However, the role of creativity in metacognitive development is a current theme in the 21st century. The age of small schooling is characterized by fantasy, curiosity, adventure, which is perceived as a suitable period for the development of creative thinking and creativity in general. During this period, the students should be aroused by their curiosity and should be encouraged to ask questions, to find answers, and so on. School institutions should not limit themselves to passing on knowledge and making students avoid school failure, but rather to take on the role of helping them to discover their potential. The development of creativity in schoolchildren makes them overcome all barriers. They will create and find unique solutions unpublished to certain problems. At school age, the student's curiosity reaches its maximum. He always strives to learn to discover, he likes to think, to find solutions, original for the accomplishment of tasks, and he must always be different from the others.

Some researchers (de Acedo Lizarraga & de Acedo Baquedano, 2013; Hargrove & Nietfeld, 2015; Jia et al., 2019) investigated the relationship between the cognitive-creative process and creativity, confirming the fact that the creative process / creativity is an important variable for development.

After studying the literature on the concept of metacognition, we can say that metacognitive skills have a beneficial role on primary schoolchildren, because students who understand their own learning process will be aware of the knowledge they possess, will be more effective in solving problems. These

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metacognitive skills have a long-term effect, helping the student to solve problems and tasks, both in school and on a daily basis.

Mih (2010) says that there is a difference between teaching the child "how" as opposed to "what" to think. The use of metacognitive strategies by a student indicates a representation of learning as a process and at the same time the awareness of learning how to learn ways to achieve learning. “The integration of strategies in the learning content induces the efficiency of the learning activity. Studies show that students with learning disabilities use strategies inefficiently or inflexibly” (Mih, 2010, p. 344).

Some reasons responsible for such strategic inefficiency in students are:

i. the reduced volume of specific knowledge in a certain field,
ii. experiences for social learning,
iii. the reduced level of self-efficacy relative to schoolwork,
iv. lack of information needed on metacognitive aspects,
v. information about metacognitive issues (not held or having information from contexts in which the effectiveness of strategies is evident),
vi. learning tasks do not require the use of strategies (Băban, 2001, as cited in Mih, 2010).

3. Research Question

The question from which we started this research is the following: In what manner creativity lead to the development of pupils' metacognitive skills?

4. Purpose of the Study

The purpose of this research is to develop an educational intervention program designed to develop the pupils creativity to help them to develop certain metacognitive skills, based on the following objectives:

i. Assessing and identifying the level of creativity of participants in this study.
ii. Elaboration and implementation of an educational intervention program for the development of pupils creativity.
iii. Evaluating the effectiveness of the intervention plan for the development of pupils creativity.

5. Research Methods

5.1. Research hypothesis

The hypothesis of this research is:

The “Little Creative” educational intervention program based on creativity will significantly contribute to the metacognitive development of pupils from primay school.

Independent variable: educational intervention program;

Dependent variable: - Creativity (elaboration, fluency, humor and imagery)

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5.2. Participants

The participants in this research were 67 students aged between 7 and 2 months-9 years (Age = 8 years, AS age = .57), students of George Coşbuc Secondary School and King Ferdinand National College, of which 32 are male and 35 female. Out of a total of 67 students, 35 students are part of the experimental group and 32 of the control group.

5.3. Measures

5.3.1. The questionnaire that evaluates the pupils creativity from primary school

The purpose of the tool is to identify the level of creativity among pupils. It contains seven topics that have been divided into four subscales (elaboration, fluency, humor, imagery). For the elaboration, three themes were proposed, the first item presupposed a rounded shape from which the students had the task of making a drawing, adding as many shapes as possible. The second item involves combining geometric shapes to form an image / drawing, and the third item involves the continuation of a sense. The measurement was based on the number of items added. The fluency included two themes, in the first item the students had the task of imagining themselves as magicians and writing the things they would do, and the second item involved adding some elements of a toy to be as fun as playing with it. The measurement was made by the number of things and elements written. For the humor, an item was proposed that included five riddles, the measurement being made according to the number of riddles to which he answered correctly. The imagery included an item in which the students were given two images to which they were required to have as many titles as they were creative. The measurement was made according to the number of titles given.

As for the rating of the answers, a scale from 1 to 10 was used and points were awarded according to the number of items added to a figure, the number of riddles to which it responded correctly and the number of titles given to an image. The 10 points represent the other levels: low, medium and high. For a low level, points were awarded from 1 to 3, for an average level from 4 to 6, and for a high level from 7 to 10. For example, for the first three items of the elaboration, added 3 elements) which represents a low elaboration. The same thing happened with the other two topics. Depending on the points obtained for all three topics, the average was made and the level of elaboration was ascertained.

The questionnaire was applied in pencil-paper variant, and the time was not restricted. This has been applied to the completion of an informed consent to ensure the confidentiality of the participants included in this research.

5.4. Procedure

This research has an experimental design, the research was extended over a period of 5 months (January 2020-June 2020), which involves conducting the experiment in three stages: pre-experimental (pre-test), experimental (test) and post-experimental (post-test).

Pre-experimental stage (pretest) The questionnaire was applied to both the experimental group and the control group to identify the level of creativity of the first grade students.

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Experimental stage (test) It took place over eight weeks and an educational intervention plan was created which included eight activities for the development of creativity.

The "Little Creative" educational intervention program contains eight activities in the languages of Communication, Mathematics and Environmental Exploration and Visual Arts and Practical Skills. The main objectives of the program were the following: to identify the most common combination of certain forms to make a product, to make a story based on certain images, to develop the ability to solve problems, to use objects in common situations and in a creative way. Methods such as: teaching game, problem solving, brainstorming, problem solving, explanation, demonstration were selected for the activities.

Post-experimental stage (post-test) There was a re-evaluation of the participants in the experimental group at the end of the intervention program to see if there were any improvements in the measured variables.

6. Findings

Table 1. The results obtained by the participants included in the study on creativity in the pre-experimental stage

Experimental group	Elaboration		Fluency		Humor		Imaging	
	M	SD	M	SD	M	SD	M	SD
Control	6,40	1,88	5,80	2,36	6,03	2,51	6,23	2,39
Experimental	3,20	1,73	2,86	1,57	2,74	1,65	2,83	1,12

Following the application of the questionnaire to measure the level of creativity for the four variables - elaboration, fluency, humor and imagery - the media presented in the first table (Table 1) and the standard media beats were recorded. Thus, for the control group, the following media were recorded: **elaboration** (M = 6.40), **fluency** (M = 5.80), **humor** (M = 6.03) and **imagery** (M = 6.23). According to the quotation of the answers for the topic in the questionnaire, the results obtained for each variable represent the average level that has increased because it is between the range 6-7, these represent the points obtained, respectively the average, average fluency, average, medium and average imagery. Regarding the participants in the experimental group, it was noted that they have low levels in terms of **elaboration** (M = 3.20), **fluency** (M = 2.86), **humor** (M = 2.74), **imagery** (M = 2.83) which means that the face of the spirit is still strong. Elaboration represents the ability to develop, build and complete an idea. The members of the experimental group have a low level in terms of the elaboration of ideas that they have managed to satisfy only to a small extent the requirements of the topics for its measurement. For example: a figure (a circle) was given to which they had to add as many figures as possible to form a product. Most of the students added two round shapes and a curved line to that shape, thus creating a smiling face. For the theme of combining a form to make a product, they used only three forms of the proposed ones, making a house, and for the continuation of one sense (the third item) a large part of the three again made a house and a sun in the sky.

Fluency involves the production of a large number of ideas and the ease of association in the plan of thought. For this reason, according to the proposed questionnaire, two topics were developed for which the students had the task of issuing a large number of ideas. Their results were low, as they issued very

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few ideas, scoring the answers based on the number of ideas written. As far as humor and imagery are concerned, the results of the experimental group have a low level because, for humor, they answered correctly to a maximum of two riddles or no riddles, although they did not present a high degree of difficulty, and for imaging, they listed the data. Thus, there was a difficulty in matching the image-titles and especially in understanding the images. Following the application of the questionnaire at the level of the experimental group, a certain reluctance was observed in the emission of a new one, repeating the same meaning twice and in a simple form, believing that this is the correct variant. Significant differences between the results obtained by the control group and the experimental stage in the pre-experimental stage can be easily observed in the parent figure.

In order to develop and achieve a good result by the experimental group, an intervention plan was developed, "Little creatives", presented in the chapter of the "Research methodology" as well as its activities.

Table 2. Independent T-test for creativity in the control group and experiment in the two experimental conditions

Experimental phase	Group		**Elaboration**	**Fluency**	**Humor**	**Imagery**
pre-test	Control group	N	35	35	35	35
		Mean	6,40	5,80	6,02	6,23
		SD	1,88	2,36	2,51	2,39
	Experimental group	N	35	35	35	35
		Mean	3,20	2,85	2,74	2,83
		SD	1,73	1,57	1,65	1,12
post-test	Control group	N	35	35	35	35
		Mean	6,83	6,43	7,08	6,88
		SD	1,65	1,88	1,85	2,05
	Experimental group	N	35	35	35	35
		Mean	5,80	5,77	5,74	5,68
		SD	.93	1,06	.81	1,13
	T independent test		$t_{(68)}= 6.80^{*}$	$t_{(68)}= 5.15^{*}$	$t_{(68)}= 6.43^{*}$	$t_{(68)}= 6.67^{*}$

$^{*}p<.001$

Following the re-evaluation, according to Table 2, there are improvements in the creativity components among the participants in the experimental group. Thus, the students obtained an average of 5.80 for the work, 5.77 for the fluency, 5.74 for the humor and 5.68 for the imagery, which is the fact that they significantly developed their creativity. Through the results obtained in the post-experimental stage, the students of the experimental group had the advantage of improving the combination and transformation of a figure or idea, the issuance of a number of ideas and solutions.

As far as the elaboration is concerned, they were much more daring in the continuation of the figures and the combination of the forms, so they made really creative products, such as mouse, robot, car, landscape, castle. For the sake of influence, the ideas generated by them were in large numbers, compared to those in the pre-experimental stage, much more creative and complex. The third component, humor, also had some improvements, as the students responded correctly to riddles and proposed

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different answer options, and for imagery, they proposed a significant number of titles, otherwise succeeding in the image-title connection. Following the re-evaluation, a significant evolution was found on the four variables: elaboration, fluency, humor and imagery, and it was observed that the subjects no longer had any concerns about the answers to the topics in the questionnaire, but tried to offer as many, more creative, ideas as possible. A change was also observed at the time in which the ideas were generated.

Calculating the size of the effect, we obtained an r = 0.74, which means that the program "Little creatives" has a high influence on the growth of the components related to the creativity of the experimental group. Therefore, **the hypothesis of this research is confirmed.**

7. Conclusions

Metacognition is a desideratum of the new postmodernist orientations promoted by constructivism that advances active learning, building knowledge through research activities, thus contributing to the development of pupils' cognitive abilities. Metacognition assesses the level of development of cognitive abilities, which allows the pupils to self-evaluate and self-regulate their own learning process. In this sense, metacognition takes the form of an “internal dialogue” of the pupil that induces a reflection on what he does, how he does and why does he do.

Mih (2010) considers metacognition to be one of the most important components of the human cognitive system. The cognitive level cannot be fully understood in the absence of a good presentation of the metacognitive functioning, respectively of the knowledge we have about the way in which the mechanisms and mental processes work such as: memorization, understanding, attention, reasoning, problem solving. In other words, this metacognitive knowledge represents reflection on one's own cognitive activities (knowing how to learn or knowing how to distinguish the memorization of a material from understanding it) and anticipating the possibilities of exploiting those reflections.

After studying the literature on the concept of metacognition, we can say that metacognitive skills have a beneficial role on primary schoolchildren, because students who understand their own learning process will be aware of the knowledge they possess, will be more effective in solving problems. These metacognitive skills have a long-term effect, helping the student to solve problems and tasks, both in school and on a daily basis.

Creativity has as its cognition a multitude of definitions, from my point of view the most appropriate definition is that of Wallace et al. (2013):

“it is the ability to think, develop and implement ideas and solutions or to bring common ideas together in a new way. Creative ability can result in a personal creative idea or product, as is often the case with small children or in an idea or product that is universally “new,” as is the case with older and older students. Creative thinking is a key element in problem solving” (p. 18).

In this research we started from the hypothesis that the educational intervention program based on creativity has made a significant contribution to the cognitive development of primary school children. Thus, the activities proposed in the program were based on the development of creativity, especially of the four components: elaboration, fluency and imagery, which will contribute to the cognitive development of primary school students, in problem solving. Following the interpretation of the results,

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the program proved to be an efficient one (r = 0.74) for the development of the other four components of the end of creativity.

Although the activities were carried out during the SARS COV-2 pandemic, the students of the experimental group showed enthusiasm for the activities and participated with great interest in them. The activities included in the intervention program were designed to ask them to develop their students' creativity and also to help them understand how they think, the knowledge they have and how they can use them creatively to solve problems.

Some suggestions for stimulating creativity among pupils would be the frequent application of the following methods: brainstorming, synectics, method 6-3-5, Phillips 6-6, panel discussion and creative problem-solving model. These are just some of the goal setting shareware that you can use. They are well-known methods that can be easily adapted to the educational process. Also, accepting and encouraging divergent thinking and rewarding those who have found new, unique solutions, encouraging students' confidence in their own judgments, accepting nonconformist opinions by asking students to argue their opinion, emphasizing that any student can and is capable to carry out creative activities and products.

With regard to the limits of this research, they would be: the applicability of the intervention program; due to the SARS COV-2 pandemic, the activities of the intervention program were applied online. Another limitation is the tool used; this is not adapted to the population of Romania, thus its psychometric properties is not being calculated, and the last limit of the research represents the sample of participants. Being a relatively small sample, I cannot support the fact that the intervention program proposed in this licensing work is the most efficient in terms of the issues discussed.

A future direction of research is to investigate a mediating relationship between an educational intervention program based on creativity - personality traits - metacognition.

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