ACROSS
Journal of Interdisciplinary Cross-Border Studies
Vol 9, No.3, 2025

ORIGINAL RESEARCH PAPER

Developing creative skills of pre-school children from the perspective of intellectual factors of creativity

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Abstract
The human psychic system is based on complex psychological processes and functions, in which activities and psychic attributes that form personality are integrated. The personality system is studied under the aspect of temperament, aptitudes and character, besides which, an important place is occupied by creativity, a term emphasized in relation to its three meanings creative behavior and psychic activity, personality structure or creative style and group creativity, all of which are relevant from the point of view of the individual's adaptation to the environment in which he lives. This complex approach needs to be started at the earliest possible stage, so that educational actions can make their mark on individual typology or in certain contexts of performance achieved as a result of group activity.
Keywords: creativity, preschoolers, originality, creativity factors, creativity potential

Introduction

The phenomenon of creation is not a simple one; it is the result of the participation of the whole personality system. M. Zlate (Zlate, 2009, p. 281) refers to four main categories of **factors that favor the manifestation of creative behavior** as a multidimensional phenomenon:

1. Internal-structural (psychological) factors:

- intellectuals, the most important of which is divergent thinking which includes the skills: fluidity, flexibility, originality, elaboration, elaboration, sensitivity, redefinition; convergent thinking and apprehension or perceptual style;

- affective-motivational: curiosity, passion, motivation, need for self-actualization;

- personality factors: attitudinal, aptitudinal, temperamental;

2. External-conjunctural (socio-cultural) factors: social, historical, social class, social class, the group to which the individual belongs, material conditions;

3. Psychosocial factors: relational environment, psychosocial climate of the individual;

4. Socio-educational factors: educational level, educational influences of family, educational institutions.

Al. Roșca (Roșca, 1972, p. 38) groups creativity factors into:

1. subjective factors: intellectual, special aptitudes and non-intellectual/non-skills;

2. objective factors: socio-educational conditions.

Another taxonomy of **factors influencing creativity**, developed by A. Munteanu (Munteanu, 1999, p. 27], classifies them into:

- Mental factors
- Social factors
- Biological factors.

1. The psychological factors that influence the creative process are:

a) cognitive-intellectual (aptitudinal) factors: these refer to the different intellectual processes and skills involved in the creative process: thinking, imagination, memory, intelligence;

The most important cognitive-intellectual factors of creativity are:

- problem sensitivity: open, receptive attitude to new things;

- Implication sensitivity: the ability to recognize problems where others do not see them;

- fluency (associativity): the ease and rapidity with which associations between images and ideas are made and followed;

- flexibility: the subject's ability to change, to restructure the way of thinking quickly, to give up old points of view and adopt new ones;

- originality: the ability to see reality differently;

- ingenuity: the ability to solve problems with original, unusually simple methods and processes;

- redefinition: the ability to restructure, interpret and transform the function of an object for new uses;

- elaboration: the ability to organize information and ideas coherently, the ability to plan an action in as much detail as possible.

b) non-cognitive factors: motivation, affectivity, attitudes.

Creativity presupposes the existence and activation of certain *character traits*: interest in a particular subject, motivation to evolve, to discover new things, to innovate in order to improve one's own activity or that of others, perseverance in action, in overcoming difficulties and factors that can halt the creative process (Jinga, 2000, p. 28).

Intellectual factors are interconnected and function in close relation to the system of needs, interests, attitudes, affections and personality traits. Character traits play an important role in creativity, equivalent to that of skills in the realization of the finished product. They do not lead to outstanding results on their own, but become an important factor to the extent that they are activated and harnessed together with character traits and intellectual factors.

The difference between creative and less creative individuals lies in motivational, attitudinal factors, and less in aptitudinal factors, since a non-conformist approach, open to the new, implicitly leads to better creative results than a conservative attitude. A

conservative approach to any situation restricts freedom of thought and interpretation, diminishes creative possibilities and generally leads to predictable and standardized results. Since excessive reasoning, conformist intellectual attitude influences the affective, motivational side, the individual cannot manifest himself in an original and independent way.

2. Social factors (cultural, educational, socio-economic): society, education, the environment provide us with inexhaustible sources of information from which we can extract content to use in our creative endeavors. Information acquired through action plays an essential role, each being a starting point for generating new products. A major impact on the level of creative development can be seen in the differences in children's backgrounds, which can significantly influence their development through the degree of access to educational resources and incentives, exposure to diversity and external influences such as role models, material and technological resources and, last but not least, the economic and social conditions of the family. These aspects particularize the development of children's creativity in this way:

a) Access to educational resources and incentives:

- Urban children usually have greater access to a wider range of educational resources, including modern schools, diverse extra-curricular activities and creative education clubs (drama, art, science, robotics). There are also more opportunities for collaboration and interaction with other children in cities, which stimulates the development of new ideas and creative solutions.

- In rural areas, access to these resources is more limited and children may be restricted in participating in innovative educational activities due to lower financial resources of schools or the community.

b) Exposure to diversity and external influences:

- Urban environments tend to offer more culturally, socially and economically diverse experiences and opportunities. Children in cities are often exposed to more varied ideas and external influences, through interacting with peers from different social and cultural backgrounds, attending international events or group meetings. This kind of diversity can stimulate creative thinking, as young children are encouraged to explore different perspectives and express their ideas more freely.

- In rural areas, geographical and social isolation can mean less exposure to different cultures and ideas. This can limit opportunities to learn new ways of thinking creatively and contribute to a narrower view of possible innovative solutions or approaches.

c) Material and technological resources:

- Urban children have wider access to technology, the internet and digital educational resources that support creative development. For example, they can have access to graphic design software, online educational platforms, programming courses or collaborative learning platforms. Modern technology makes it quick and easy to experiment with new ideas.

- In rural areas, access to state-of-the-art technology is often limited, and many children lack advanced educational resources or good internet connectivity. This can limit their creative development in areas that depend on technology and innovation.

d) Economic and social conditions:

- Rural areas often face economic limitations and less access to financial resources for education. These limitations can affect educational infrastructure, and rural children may have fewer opportunities to engage in extra-curricular activities that develop their creativity.

- In addition, social norms in rural areas can be more conservative and put pressure on children to respect established traditions and norms, which can reduce the freedom to explore new ideas and express creativity in unconventional ways.

Also at the social level, the older generations have a strong influence on the creativity of those who come after them: this is reflected in different situations, in the fact that the young learn from the behavior of adults, and in the way adults cultivate, stimulate and foster creative behavior in children or others around them.

c. ***Biological factors:***

In addition to the transmission of characteristics favorable to creativity through genetic material, the study of biological factors has brought into question the implications of age as well as gender on creative outcomes. Thus, it has been found that as we grow older, mental plasticity decreases, which affects the quality and quantity of creative output. This is, however, offset by the subject experience that comes with age. Biological factors interrelate with cultural factors which, through social stereotypes, together with self-perception, can influence the development of creativity in this way:

- certain areas are more encouraged for one gender and less for another. These issues influence the development of creativity in that, in many cultures, gender stereotypes determine which activities are considered suitable for boys or girls. These stereotypes can influence creative development in that certain areas are more encouraged for one gender and less for another. For example, boys are often encouraged to engage in physical or technical activities such as construction, science and math, activities that stimulate logical and innovative thinking. In contrast, girls may be encouraged more towards artistic and social activities, which can develop other types of creative skills, but less focused on technical thinking or putting ideas into practice. These differences can affect how children perceive their own creative abilities and their confidence to explore different areas, limiting their creative potential.

- Many educational institutions have resources that encourage creative thinking, such as science clubs, art groups, role-playing or extra-curricular activities. However, in many cases, access to these resources may differ between boys and girls, depending on social expectations. For example, boys may be more likely to participate in activities that develop technical skills (robots, IT, math), while girls may be more encouraged to participate in activities that develop empathy and artistic creativity. This can lead to an imbalance in the development of creativity between boys and girls, even in the same educational environment, thus influencing their competences in different areas.

c) Self-perception and self-confidence: in some cases, boys may be more confident in their creative abilities than girls, even if both have the same resources or opportunities. This may be a result of upbringing and culture, where boys are often encouraged to be more assertive, express their ideas and take risks. Girls, on the other hand, may learn to be more reserved in expressing their opinions and ideas, which can affect their creative

development. Thus, differences in self-perception can have a direct impact on the level of creativity, as self-confidence is essential for exploring and expressing new ideas.

The most important aspect in creativity is not the presence of all the factors, but the relationship between them and how they interact. The fact that an individual possesses a native creative potential does not implicitly lead to the realization of an effective creative act, but only under conditions of psycho-individual, cultural and social stimulation, as a result of the interdependent influences of these factors.

Materials and methods

Materials

Starting from the idea that every subject benefits from a creative potential, it was concluded that it can be influenced by the environment in which he or she lives and the education each individual receives. *"All people are in varying degrees creative, and only some of them are gifted"* (Stoica, 1983, p. 180). It is also noted different levels of manifestation of creativity, it can be high, medium or low. Talent has been approached as *"a superior development of general and special aptitudes and as a happy combination of them"* (Stoica, 1983, p. 181).

Creativity includes, however, more complex personality structures, the influence of which goes beyond aptitudes. It requires the integration of knowledge and experience already acquired in new contexts, by rethinking them and establishing new causal links and relationships between them. More important than finding new solutions is the formulation of problems, in which case heuristics are used, triggering a chain of questions and answers. *"Creativity is essentially a personality structure that involves the optimal interaction between predominantly creative attitudes and general and special skills at the superordinate and higher levels"* (Popescu-Neveanu, 1978, p. 183). The existence of aptitudes is not sufficient to generate creative products, as long as they are not strategically oriented towards original discoveries through motivation and attitudes.

The preschool age is considered to be a very favorable period for the development of creativity as progressive changes take place in many areas of the preschoolers' personality, especially in the improvement of mental processes (Golu *et al*, 1993, p. 84) (attention, memory, thinking, language, imagination), which are considered to be the driving force of creative actions. This perspective is supported by the fact that the creative process is considered to be the result of mental activity, the ability to successfully accomplish multiple activities from a wide range of action. At the age of early pre-school, mental processes have distinct characteristics, showing an evolution compared to the previous age stage, thus favoring the realization of new, more complex and creative activities.

During the pre-school period, in addition to using familiar concepts and skills, children develop the mental processes that will help them adapt to school and social life. Some authors highlight the child's ability to *"combine and recombine the representations available to him or her"* in different contexts, *"to construct reality from his or her own images"* (Golu *et al*, 1993, p. 96). As the older preschooler is able to organize his or her activities much better than at earlier stages, he or she will also develop a critical attitude towards the results of these activities, and will systematically intervene in them. This approach enables the pre-school child to investigate, test, revise and creatively intervene in

order to optimize the decisions taken. Physical development itself enables more detailed actions to be carried out on objects and increases the investigative and creative impact of work products. Motricity facilitates interaction with the environment and, as a result, the most varied possible contact with it, transforming it into an inexhaustible source of information which will form the cognitive basis of the creative process.

Taking these aspects into account, we proposed to conduct a pedagogical experiment in 3 stages, with the aim of identifying the specifics of creativity at preschool age and the psycho-pedagogical conditions that can stimulate or inhibit its development.

Methods

The objectives of the pedagogical experiment were related to the determination of the level of development of creativity of preschool children aged 5-6 years through activities with mathematical content, highlighting gender differences and those due to the children's background (urban/rural) in terms of the level of development of creativity and quantitative, qualitative and comparative analysis of experimental data.

The sources for analyzing the experimental data were the initial and final evaluation samples of creativity through originality. The analysis of experimental data was completed with the method of studying the products of preschoolers' activity, obtained in the formative experiment stage, by applying the model of developing preschoolers' creativity through integrated activities with mathematical content.

The variables followed in the research were intended to highlight the effectiveness of the experimental approach, being represented by independent variables (gender of the preschoolers, their age, their background) and dependent variables (fluency, flexibility, originality and elaboration capacity regarding the manifestation of creativity in different situations).

For this experiment were selected 90 preschool children aged 5-6 years from kindergartens in Romania and the Republic of Moldova, both urban and rural.

In order to identify the level of creative development of the preschoolers in the target group, we looked for their originality both during the realization of the tasks and in terms of the novelty of the finished product, in relation to the individual possibilities of the children.

Originality has been most commonly used in assessing creativity, first mentioned by J. P. Guilford (Guilford, 1962, p. 89) in 1950, along with fluency, flexibility, elaboration ability, sensitivity to problems, and redefinability. In 1992, P. E. Torrance (Torrance, 2019, p. 167) added two more, namely resistance to premature closure and semantic abstraction capacity. Since the specificity of the development of mental processes at the preschool age limits the ability of preschoolers to act in the direction of using generalization and abstraction of information around the age of 5, we consider that the relevance of the selected indicator for highlighting the level of creativity of preschoolers is justified by the results they provide in relation to the possibilities of children.

In order to evaluate the originality in the creative activities of the preschoolers involved in the research, the test "Playing with figures" was proposed. The aim of this test is the elaboration of novel images as a result of transposing representations or products of imagination into drawing - a test of figural creativity. The materials needed for the test

were: a sheet of paper, geometric figures as a support for the basic outline, crayons, colored pencils.

Results and discussion

Analyzing the experimental data obtained from the evaluation of the children involved in the research, we have delimited the following results: the relatively high percentages, corresponding to the *Behavior Achieved/ Achieved* in terms of the manifestation of originality (48%, 36%, 52.94%, 39.13% per kindergarten, 43.33% total) are due to the fact that the task of the sample involved the making of drawings, a preferred activity of preschoolers, which gives them the possibility of innovation and free expression in writing, much more accessible than the oral formulation of ideas at this age. The fact that there was a well-defined starting point (the outline created using geometric shapes) made it easier to create the support on which to realize the objects by adding detail. The number of these elements was the basic criterion for assessing the originality of the pre-schoolers, also taking into account the details added. In this test too, the percentage of pre-schoolers showing *Behaviour in development/ in progress* (42.22%), together with those *needing support/ not achieved* (14.44%), is higher than that of pre-schoolers with *Behaviour achieved/ achieved* (43.33%), which means that action must be taken to increase the percentage of the latter.

In terms of gender dispersion, this factor also shows the dominance of girls in terms of *Behavior attained/achieved*, 23 girls (50% of the female target group), while only 16 boys (36.36% of the male target group) fall into this type of behavior, but for *Behavior in development/ in progress*, of the 38 preschoolers, 22 are boys (50% of all boys) and 16 girls (34.78% of all girls). The pre-schoolers *requiring support/ not achieved behavior* on the factor "originality" represent a percentage of 14,44%, cumulating 7 girls (15,21% of the female target group) and 6 boys (13,63% of the male target group).

In terms of comparing the results according to background, 43.75% of the corresponding target group (21 children) of the pre-schoolers demonstrated *a behavior achieved/achieved* for the urban environment, 41.66% (20 children) a *behavior in development/ in progress* and 14.58% (7 children) a *behavior in need of support*. For rural, 42.85% of the preschoolers in the corresponding target group (18 children) fell within the specific values of *Behavior Attained/Achieved*, 42.85% of the rural preschoolers (18 children) achieved a *Developing/Achieving behavior* and 14.28% (6 children) of the rural fell into *Behavior Needs Support/Not Achieved.*

Following the results obtained, a formative program was designed and implemented to develop the creativity of pre-school children, especially in the direction of obtaining original actions and products, to which the children have given social utility and implicit value. The program lasted one school year.

In the control phase of the pedagogical experiment, originality was assessed through the "Let's build!" test. The aim of the test was to develop novel objects/ constructions by combining geometric figures, and the means used in the game were the pieces from the Logi 2 kit.

The results of the assessment of the preschoolers surveyed in this sample revealed very good results: 88.9% for the *Behavior Achieved* and 11.1% for the *Behavior in development/ in progress*, and no child was positioned in the *Behavior in need of support/*

not achieved. The gender distribution of the children's results in the case of originality shows a higher number of girls than boys for the *Behavior Achieved/ Achieved*: 41 girls (89.13% of the total female target group) and 39 boys (88.63% of the total male target group), and for the *Behavior in development/ in progress* there is equality: 5 girls (10.86% of the total girls) and 5 boys (11.36% of the total boys).

From the perspective of the background, the results mention 89.58% of preschoolers for the urban environment for *Behavior attained/achieved* and 88.09% for the rural environment, while 10.41% of urban preschoolers and 11.9% of rural preschoolers were classified for *Behavior in development/ in progress.*

Several statistical tools were used for statistical analysis of the data obtained in the research:

1. ***Wilcoxon Signed Ranks test*** to extract significant differences between two dependent variables

2. ***Mann-Whitney U test***, for comparing differences in scores between two independent groups (e.g., gender or urban vs. rural) after the intervention.

Following the application of the Wilcoxon Signed Ranks test, a significant improvement in performance was found following the educational intervention program:

Positive ranks: 51 subjects (56.7%) showed significant improvement. Thus, the participants' scores obtained in the post-intervention test "Let's Build" were significantly higher compared to the initial scores obtained in the pre-intervention test "Playing the Picture Game".

Negative ranks: There were no negative ranks, i.e. none of the participants scored lower on the post-intervention assessment compared to the pre-intervention assessment.

Equal ranks: 39 (44.3%) of the participants obtained the same score on both tests, results indicating no change post-intervention.

The Z=-5.260 test, with an associated p-value of .000 (2-tailed asymptotic significance), indicates a significant difference between pre- and post-intervention scores ($p < .001$). This statistically significant result supports the conclusion that the educational intervention program led to significant improvements in participants' performance on the post-intervention "Let's Build" test compared to their baseline scores on the pre-intervention "Playing the Figure Game" test.

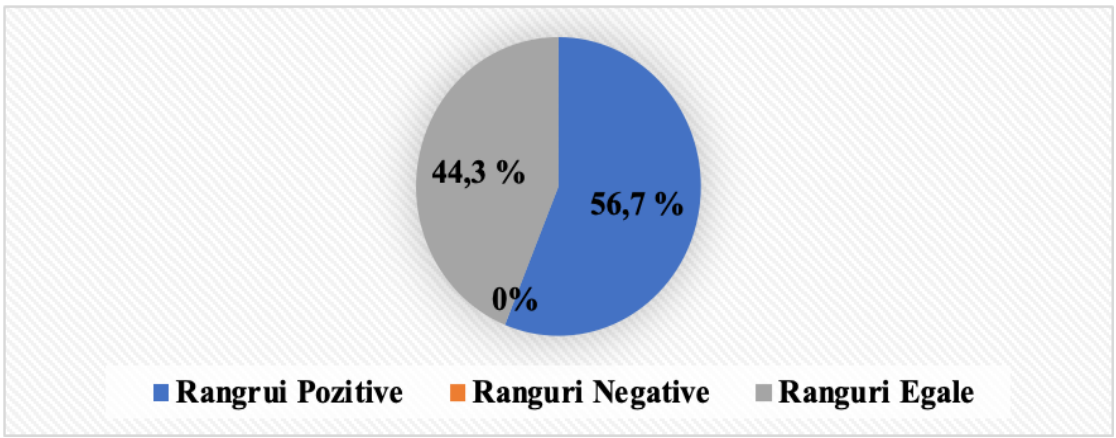

Figure 1. Percentage distribution, Samples The Figure Game/ Let's build

In terms of ***differences based on gender, the*** Mann-Whitney U test results indicate some differences between boys and girls: this may suggest that girls were more receptive to this specific type of task, potentially due to factors such as creativity or verbal reasoning being more strongly involved. Other tasks show no significant gender differences, suggesting that the formative program had a broadly equal impact between the sexes, despite some variation in specific activities.

With regard to ***differences based on background (urban vs. rural), the*** Mann-Whitney U test comparing urban and rural participants showed no significant differences in creative performance.

Although the differences were not statistically significant, there are some visible trends in the middle ranks that provide insight into potential areas of interest:

- *Urban participants:* In all tasks, urban participants have slightly higher average ranks compared to their rural counterparts, suggesting a slightly better performance bias.

- *Rural participants:* Despite slightly lower average rankings, the performance of rural pre-schoolers is quite close to that of their urban peers.

Conclusions

Among the components of personality at pre-school age, we note that aptitudes are the most influential, starting from the idea that every subject has certain aptitudes, an initial creative potential, and that this can be influenced by the environment in which he or she lives and the education each individual receives. The very ways in which the knowledge and skills planned in the integrated activities are combined and recombined in different learning structures and situations means that the child is in a position to find innovative solutions and apply what he or she has learned in new contexts, producing creative, original products, which he or she can influence through his or her temperament, character and aptitudes, as well as through innovation, flexibility of thought, fluency of ideas and the possibility of transferring knowledge from different fields. The opportunities for manifestation and innovation are fostered in integrated activities, which facilitate the interdisciplinary transfer of knowledge and skills, combining the specifics of the areas of interest with concepts and skills characteristic of activities in experiential areas. As the design and implementation of the activities are child-centered, children are free to choose the activities they wish to carry out, work at their own pace, combine ideas, materials and objects to obtain the final product they have given or invented, according to their personal interests.

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