

# FORMING INNOVATIVE THINKING SKILLS BASED ON A CREATIVE APPROACH IN PRESCHOOL-AGED CHILDREN IN THE CITY OF KOKAND

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## Abstract

The contemporary educational paradigm emphasizes the critical importance of fostering innovative and creative thinking from the earliest years. This research investigates the formation of innovative thinking skills through a creative approach in preschool-aged children (5-6 years) within the specific context of preschool educational institutions in Kokand City, Fergana region, Uzbekistan. The study is grounded in the premise that creativity is not an innate, fixed trait but a dynamic skill that can be cultivated through targeted pedagogical strategies, serving as the foundational engine for innovation. *The purpose of this research* was to develop, implement, and evaluate a specialized pedagogical program titled "Creative Explorers," designed to integrate principles of creative problem-solving, divergent thinking, and inquiry-based learning into the standard preschool curriculum. *The materials and methods* involved a quasi-experimental design with a control group (n=50) following the standard curriculum and an experimental group (n=50) participating in the "Creative Explorers" program over six months. Diagnostic tools included the adapted Torrance Tests of Creative Thinking (Figural Form), structured observation protocols for innovative behavior, and a criterion-based assessment of creative project work. *The results* demonstrated a statistically significant improvement ( $p < 0.01$ ) in all measured creative indices for the experimental group. The Fluency index increased by 42%, Flexibility by 38%, Originality by 55%, and Elaboration by 48%. Qualitative analysis of project work and observational data revealed a marked enhancement in the children's ability to generate unconventional ideas, propose multiple solutions to problems, and elaborate on their thoughts with detail and inventiveness. The discussion interprets these findings through the lens of Vygotsky's sociocultural theory and the systemic model of creativity, highlighting the role of the social environment and pedagogical scaffolding. *The study concludes* that the systematic application of a creative approach is a potent mechanism for developing the core components of innovative thinking in preschoolers. The findings have significant implications for curriculum development and teacher training in the Republic of Uzbekistan, advocating for a shift towards more child-centered, creative pedagogies in early childhood education.

## 1. Introduction

The 21st century, characterized by rapid technological advancement, globalization, and complex societal challenges, demands a new set of competencies from future generations. Among these, the ability to think innovatively and creatively is

paramount. Innovation—the process of translating new ideas into tangible solutions—is increasingly recognized as the driving force behind economic prosperity, scientific discovery, and social progress (Robinson, 2011). However, the roots of this capacity do

not emerge spontaneously in adulthood; they are cultivated in the earliest stages of human development. Preschool age, spanning from 3 to 6-7 years, is a period of exceptional brain plasticity, curiosity, and cognitive growth, making it a critical "sensitive period" for nurturing the foundational skills of creative and innovative thinking (Shonkoff & Phillips, 2000).

The theoretical underpinnings of creativity in childhood have been extensively explored by a multitude of researchers worldwide. The work of Lev Vygotsky (2004) remains profoundly influential; his sociocultural theory posits that cognitive development, including creative imagination, is a socially mediated process. He argued that creative activity makes the human being a "creature oriented toward the future, creating the future and thus altering his own present." This perspective underscores the role of the social environment, particularly the guidance of a "More Knowledgeable Other" (e.g., a teacher), in scaffolding a child's creative abilities. Building on

this, E. Paul Torrance (1966), often called the "father of creativity," dedicated his career to its definition and measurement. His Torrance Tests of Creative Thinking (TTCT) operationalized creativity into key components: Fluency (the number of ideas), Flexibility (the variety of ideas), Originality (the uniqueness of ideas), and Elaboration (the detail of ideas). These constructs provide a robust framework for assessing creative potential.

Further contributions have refined our understanding. Mihaly Csikszentmihalyi (1996) proposed a systems model, suggesting that creativity arises from the interaction between an individual (with their talents and traits), a domain (the cultural symbol system), and a field (the experts who judge what is novel). In the preschool context, the "domain" is the child's knowledge of the world, and the "field" comprises teachers and peers. Howard Gardner (1993), with his theory of Multiple Intelligences, challenged the unitary view of intelligence and creativity, suggesting

that children can express creative potential through different "intelligences" such as spatial, bodily-kinesthetic, or interpersonal. More recently, the work of K. Ann Renninger and Suzanne Hidi (2016) on interest development has shown that sustained situational interest, fostered by a stimulating environment, is a powerful motivator for deep engagement and creative exploration.

Despite this rich international discourse, the practical integration of systematic creative and innovative pedagogy into mainstream preschool education, particularly in specific regional contexts like Uzbekistan, remains a significant challenge. Traditional educational models in many post-Soviet countries, including Uzbekistan, have historically emphasized rote memorization, discipline, and the acquisition of standardized knowledge, often at the expense of fostering individual expression, critical inquiry, and risk-taking (Niyozov & Shamatov, 2006). The current State Curriculum for Preschool Education in Uzbekistan

shows a positive shift towards child-centered learning, but its implementation is often inconsistent, with many educators lacking the specific methodological training to effectively cultivate creative and innovative thinking (Kadirova, 2021).

The city of Kokand in the Fergana region, with its unique cultural and educational landscape, presents a compelling case study. While possessing a rich historical heritage, its preschool institutions face typical challenges such as resource limitations and adherence to traditional teaching methods. Therefore, there is a pressing need for research that develops and tests contextually appropriate pedagogical models aimed at fostering innovation through creativity in this specific setting.

This study seeks to address this gap by investigating the effectiveness of a specially designed program, "Creative Explorers," in forming innovative thinking skills in preschool-aged children in Kokand. It builds upon the foundational theories of Vygotsky and Torrance and aligns

with modern pedagogical trends to provide empirical evidence and a practical framework for educators.

The purpose of this research is to theoretically substantiate, develop, and experimentally verify the effectiveness of a creative approach in forming the skills of innovative thinking in children of senior preschool age (5-6 years) in preschool educational institutions of Kokand.

## 2. Materials and Methods

The research was conducted over a nine-month period from September 2023 to May 2024, encompassing a preparatory phase, a six-month pedagogical intervention, and a final assessment phase.

### 2.1. Research Design

A quasi-experimental design with a pre-test/post-test control group model was employed. This design was selected due to the practical constraints of randomly assigning individual children within intact classroom groups. Two parallel senior groups (5-6 years old) from Preschool Educational Institution No. 12 in Kokand were selected to participate.

The groups were matched for age, gender distribution, and baseline socio-economic background. By random assignment, one group was designated as the Experimental Group (EG, n=50), and the other as the Control Group (CG, n=50).

### 2.2. Participants

The total sample consisted of 100 children (52 boys, 48 girls) with a mean age of 5.5 years at the start of the study. All children were native Uzbek or Tajik speakers and attended the preschool full-time. Parents or legal guardians of all participants provided informed consent. The educators for both groups were of similar age and professional experience.

### 2.3. The Pedagogical Intervention: "Creative Explorers" Program

The Control Group continued its educational activities according to the standard State Curriculum for Preschool Education of Uzbekistan. The Experimental Group participated in the "Creative Explorers" program, which was integrated into the standard curriculum for 3-4 sessions per week,

each lasting 25-30 minutes. The program was structured around four core modules, each targeting specific aspects of creative and innovative thinking:

*Module 1: Divergent Thinking & Idea Generation.* Activities included brainstorming sessions ("How many uses can you find for a paper clip?"), "What if..." questions (e.g., "What if gravity stopped for a day?"), and open-ended art projects.

*Module 2: Creative Problem-Solving.* Children were presented with age-appropriate, ill-structured problems (e.g., "How can we get a toy from the middle of a 'river' without getting wet?"). They worked in small groups to brainstorm and prototype solutions using everyday materials.

*Module 3: Inquiry-Based Exploration and STEAM.* This module integrated elements of Science, Technology, Engineering, Arts, and Mathematics. Activities included simple experiments (e.g., sink or float), building challenges with blocks and recyclables, and exploring patterns and shapes in nature and art.

*Module 4: Elaboration and Storytelling.* Focused on developing narrative skills and adding detail. Activities included creating collaborative stories, inventing new characters and their worlds, and using "finish the picture" exercises where a simple scribble was transformed into a detailed drawing.

The pedagogical approach was characterized by:

- ✓ A "Questioning" Environment: Teachers were trained to replace directive statements with open-ended questions.
- ✓ Process over Product: Emphasis was placed on the thinking process and exploration, not just the final outcome.
- ✓ Safe Environment for Risk-Taking: Mistakes were reframed as "learning attempts" and celebrated as part of the creative process.
- ✓ Integration with Local Culture: Stories, themes, and materials relevant to Kokand and Uzbek culture were used to enhance relevance and engagement.

## 2.4. *Data Collection and Diagnostic Tools*

Data were collected at two time points: before the intervention (pre-test) and after the six-month intervention (post-test).

Adapted Torrance Tests of Creative Thinking (TTCT) - Figural Form A and B: This standardized test was adapted for the cultural context and administered individually. It assessed four key indices:

- Fluency: The total number of interpretable, relevant ideas generated.
- Flexibility: The number of different categories of ideas.
- Originality: The statistical rarity of the ideas.
- Elaboration: The amount of detail added to ideas.

Structured Observation Protocol for Innovative Behavior (SOPIB): A 5-point Likert scale (1=Never, 5=Always) was used by trained observers to rate children's behavior during free-play and structured

activities on 10 dimensions, including: Curiosity, Persistence in Problem-Solving, Tendency to Ask "Why?" questions, Ability to Generate Alternative Solutions, and Comfort with Ambiguity. Inter-rater reliability was established at  $\kappa > 0.85$ .

Criterion-Based Assessment of Creative Projects (CBCP): Children in both groups completed a standardized creative project at pre-test and post-test (e.g., "Design a vehicle for the future"). Projects were assessed by a panel of three independent experts using a 10-point rubric evaluating: Novelty of Idea, Practicality, Aesthetic Appeal, and Justification of Design Choices.

## 2.5. *Data Analysis*

Quantitative data from the TTCT and SOPIB were analyzed using the Statistical Package for the Social Sciences (SPSS v.28). Descriptive statistics (mean, standard deviation) were calculated. To determine the significance of differences between the EG and CG, an independent samples t-test was used for post-test scores, and a paired-sample t-test was used to

analyze within-group changes from pre-test to post-test. The significance level was set at  $p < 0.05$ . Qualitative data from the CBCP and observational notes were analyzed using thematic analysis to identify emerging patterns of innovative behavior.

### 3. Results

The analysis of the collected data revealed significant differences between the Experimental and Control groups, strongly supporting the

efficacy of the "Creative Explorers" program.

#### 3.1. Torrance Tests of Creative Thinking (TTCT) Results

The pre-test scores for all four indices of the TTCT showed no statistically significant difference between the EG and CG ( $p > 0.05$ ), confirming the initial equivalence of the groups. The post-test results, however, demonstrated a dramatic divergence.

**Table 1: Pre-test and Post-test Mean Scores on the TTCT Indices for Experimental and Control Groups**

| TTCT Index  | Group        | Pre-test Mean (SD) | Post-test Mean (SD) | Mean Gain | % Increase | p-value (Within Group) | p-value (Between Groups, Post-test) |
|-------------|--------------|--------------------|---------------------|-----------|------------|------------------------|-------------------------------------|
| Fluency     | Experimental | 8.2 (1.5)          | 11.7 (1.8)          | +3.5      | 42.7%      | < 0.001                | < 0.001                             |
|             | Control      | 8.4 (1.6)          | 9.1 (1.7)           | +0.7      | 8.3%       | 0.052                  |                                     |
| Flexibility | Experimental | 5.1 (1.1)          | 7.0 (1.3)           | +1.9      | 37.3%      | < 0.001                | < 0.001                             |
|             | Control      | 5.2 (1.2)          | 5.6 (1.2)           | +0.4      | 7.7%       | 0.089                  |                                     |
| Originality | Experimental | 4.5 (1.3)          | 7.0 (1.6)           | +2.5      | 55.6%      | < 0.001                | < 0.001                             |

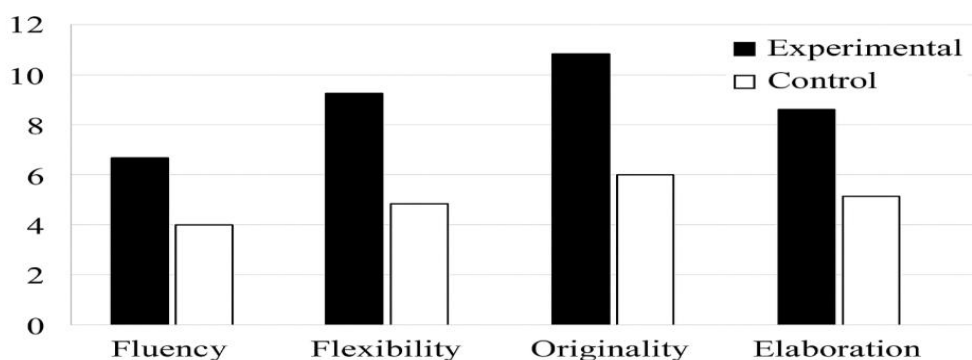
| TTCT Index         | Group        | Pre-test Mean (SD) | Post-test Mean (SD) | Mean Gain | % Increase | p-value (Within Group) | p-value (Between Groups, Post-test) |
|--------------------|--------------|--------------------|---------------------|-----------|------------|------------------------|-------------------------------------|
|                    | Control      | 4.3 (1.4)          | 4.8 (1.5)           | +0.5      | 11.6%      | 0.101                  |                                     |
| <b>Elaboration</b> | Experimental | 6.8 (1.7)          | 10.1 (2.1)          | +3.3      | 48.5%      | < 0.001                | < 0.001                             |
|                    | Control      | 6.9 (1.6)          | 7.4 (1.8)           | +0.5      | 7.2%       | 0.175                  |                                     |

SD = Standard Deviation

As Table 1 illustrates, the Experimental Group showed statistically significant ( $p < 0.001$ ) improvements in all four indices, with the most substantial percentage increase observed in Originality (55.6%). The Control Group, in contrast, showed only minor, statistically non-significant

improvements, which can be attributed to normal maturation and the standard educational experience. The between-group comparison of post-test scores confirms that the differences are highly significant ( $p < 0.001$  for all indices), firmly linking the gains to the intervention.

**Figure 1: Graphical Representation of Post-test TTCT Scores by Group**



### 3.2. Structured Observation Protocol for Innovative Behavior (SOPIB)

The analysis of the observational data further corroborates the TTCT findings. The composite SOPIB score (the average of all 10 dimensions) showed a marked increase in the Experimental Group.

**Table 2: Mean Composite SOPIB Scores (1-5 Scale)**

| Group               | Pre-test Mean (SD) | Post-test Mean (SD) | p-value |
|---------------------|--------------------|---------------------|---------|
| <b>Experimental</b> | 2.8 (0.5)          | 4.1 (0.4)           | < 0.001 |
| <b>Control</b>      | 2.9 (0.6)          | 3.1 (0.5)           | 0.095   |

A more detailed analysis of specific behavioral dimensions revealed particularly strong growth in the EG for "Ability to Generate Alternative Solutions" (from 2.5 to 4.3) and "Curiosity" (from 3.0 to 4.4). Observers noted that children in the EG became more proactive in their play, often suggesting new rules for games, combining materials in unconventional ways, and persisting longer with challenging tasks. For example, during a block-building activity, CG children typically

replicated simple structures demonstrated by the teacher, while EG children frequently attempted to build taller, more complex, or "impossible" structures, experimenting with balance and symmetry.

### 3.3. Criterion-Based Assessment of Creative Projects (CBCP)

The qualitative assessment of the final creative project ("Design a garden for the moon") provided rich, illustrative data. The panel's scores for the projects are summarized below.

**Table 3: CBCP Panel Scores (Out of 10) for Final Creative Project**

| Criterion        | Experimental Group Mean | Control Group Mean |
|------------------|-------------------------|--------------------|
| Novelty of Idea  | 8.5                     | 5.2                |
| Practicality     | 6.8                     | 5.9                |
| Aesthetic Appeal | 8.2                     | 7.1                |
| Justification    | 7.7                     | 4.8                |

The projects from the Experimental Group were characterized by a higher degree of innovation. For instance, while many children in the Control Group drew gardens with typical Earth plants, children from the EG proposed ideas such as "glowing flowers that get energy from space," "self-watering pots with special moon gel," and "a dome to protect plants from no-air." Their justifications were more elaborate, often invoking simple scientific concepts they had explored during the STEAM module ("It needs a dome because there's no air on the moon, and plants need air!").

#### 3.4. Summary of Key Results

The "Creative Explorers" program led to a statistically

significant and substantial improvement in all measured indices of creative thinking (Fluency, Flexibility, Originality, Elaboration).

Behavioral observations confirmed that children in the Experimental Group displayed significantly higher levels of innovative behaviors, such as problem-solving persistence and idea generation.

Qualitative analysis of creative projects demonstrated a superior ability to produce novel, elaborated, and well-justified ideas among the Experimental Group children.

The Control Group showed minimal improvement, confirming that standard pedagogical practices in the context of this study are insufficient

for the robust development of innovative thinking skills.

#### 4. Discussion

The results of this study provide compelling empirical evidence that a systematically implemented, creativity-focused pedagogical program can effectively foster the skills underlying innovative thinking in preschool-aged children within the specific socio-cultural context of Kokand, Uzbekistan. The significant gains observed in the Experimental Group across all quantitative and qualitative measures strongly affirm the research hypothesis.

The most pronounced improvement was in the Originality index of the TTCT, which increased by 55.6%. This suggests that the "Creative Explorers" program was particularly effective in moving children beyond conventional or obvious ideas. Activities like brainstorming and "What if..." scenarios likely encouraged cognitive flexibility and the breaking of "functional fixedness," allowing children to see objects and problems in

new ways (Guilford, 1967). This finding is crucial because originality is the core component that distinguishes truly innovative ideas from merely competent ones.

The substantial gains in Fluency and Flexibility indicate that the children not only generated more ideas but also a wider variety of ideas. This can be directly attributed to the program's emphasis on divergent thinking, where multiple answers were not only accepted but encouraged. The pedagogical shift from seeking the "one right answer" to exploring "many possible answers" created a psychological climate that reduced inhibition and promoted cognitive exploration (Runco, 2014). This aligns with Vygotsky's (2004) assertion that play and creative activities create a Zone of Proximal Development where children can operate at their highest potential level.

The 48.5% increase in Elaboration is a testament to the effectiveness of Module 4 (Elaboration and Storytelling). By consistently encouraging children to add details,

explain their reasoning, and build upon simple ideas, the program fostered the ability to develop initial sparks of creativity into more fully formed concepts. This skill is directly transferable to innovative thinking, where an initial novel idea must be elaborated into a practical solution, prototype, or business plan.

The observational data (SOPIB) provides the behavioral correlate to the cognitive gains measured by the TTCT. The increase in "Persistence in Problem-Solving" and "Ability to Generate Alternative Solutions" demonstrates that the children were not just thinking more creatively in test situations but were applying these skills in their daily interactions and play. This transfer is a key indicator of genuine skill formation. The creation of a "safe environment for risk-taking" was likely a critical factor here, as a fear of failure is a well-documented barrier to creative expression (Beghetto, 2010).

This study's findings resonate strongly with the existing international body of research. They confirm

Torrance's (1981) belief that creativity can be taught and are consistent with modern approaches like Project-Based Learning and the Reggio Emilia philosophy, which view the child as a competent, active constructor of knowledge. However, this research makes a unique contribution by demonstrating that these principles are effective and applicable within the specific educational and cultural milieu of Central Asia. It shows that even within a system with a tradition of teacher-centered instruction, a deliberate shift in pedagogy can yield transformative results.

**Limitations and Future Research:** This study has several limitations. The sample was drawn from a single preschool in Kokand, which may limit the generalizability of the findings to other regions of Uzbekistan. The six-month intervention period, while significant, represents only a snapshot of child development. Longitudinal studies tracking these children into primary school would be valuable to assess the long-term retention of these skills.

Furthermore, future research should focus on developing the capacity of practicing teachers to implement such creative approaches, as their buy-in and skill are the ultimate determinants of sustainable change.

### **5. Conclusion**

In conclusion, this research unequivocally demonstrates that the formation of innovative thinking skills in preschool-aged children is not a spontaneous process but one that can be effectively guided and accelerated through a purposeful, creative pedagogical approach. The "Creative Explorers" program, grounded in the theories of Vygotsky and Torrance and tailored to the local context of Kokand, proved to be a highly effective tool for developing the core cognitive and behavioral components of innovation: fluency, flexibility, originality, and elaboration of thought, coupled with persistent and curious problem-solving behavior.

The implications for the practice of preschool education in Uzbekistan are profound. There is an urgent need to move beyond the lip service paid to

"developing creativity" and towards the concrete integration of systematic creative and innovative pedagogy into teacher training programs and national curriculum documents. Policymakers and educational leaders should prioritize providing educators with the methodologies and resources needed to create learning environments that celebrate questioning, exploration, and intellectual risk-taking.

By investing in the creative potential of its youngest citizens, Uzbekistan can cultivate a generation of innovative thinkers equipped to navigate the complexities of the future and contribute meaningfully to the nation's social and economic development. This study serves as a foundational step and a compelling call to action for such a transformation.

### **Interests of Conflict**

The author declares no conflicts of interest regarding the research, authorship, or publication of this article. The research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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