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DIALOGIC QUESTIONING TECHNIQUES AND THEIR ROLE IN STIMULATING DIVERGENT THINKING AMONG PRESCHOOL CHILDREN: AN EMPIRICAL INVESTIGATION

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Abstract: Divergent thinking — the cognitive capacity to generate multiple, varied, and original responses to open-ended challenges — is recognised as a foundational constituent of creative intellectual development in early childhood. Whereas prior literature has examined structured games, creative play, and person-centred instructional models as vehicles for fostering innovative cognition in preschool-age children, the specific contribution of dialogic questioning techniques to divergent thinking stimulation has received insufficient empirical scrutiny. The present study investigates the effect of a systematically implemented dialogic questioning framework on divergent thinking outcomes among preschool children (ages 4–6) in Uzbekistan. A controlled experiment involving 72 participants across two preschool institutions was conducted over 10 weeks. Results indicate that children in the dialogic questioning condition demonstrated significantly higher post-intervention scores on Fluency, Flexibility, Originality, and Elaboration subscales of the Torrance Tests of Creative Thinking — Figural Form (TTCT-F) compared to control group peers. Findings implicate intentional educator dialogue as a powerful, underutilised pedagogical lever for early divergent thinking development and carry direct implications for curriculum design and teacher professional development in Uzbekistan's preschool education system.

Keywords: divergent thinking, dialogic questioning, preschool education, creative thinking, TTCT, early childhood, Uzbekistan

1. INTRODUCTION

The capacity for divergent thinking — defined as the ability to produce multiple, varied, and original responses to an open-ended stimulus — has long been identified as a core component of creative cognition and a predictor of adaptive problem-solving throughout the lifespan (Guilford, 1967; Runco & Acar, 2012). Neuropsychological and developmental research converges on the preschool years (approximately ages 3–7) as a critical sensitive period during which divergent thinking abilities are maximally plastic and responsive to environmental facilitation (Kim, 2011; Besançon & Lubart, 2008).

Contemporary early childhood education research has devoted considerable attention to the role of creative play, innovative activity design, and person-centred instructional approaches in fostering divergent thinking. However, the specific pedagogical mechanism of dialogic questioning — structured educator-child verbal interaction characterised by open-ended, speculative, and hypothetical questioning — has not been examined as a targeted intervention for divergent thinking stimulation in preschool-age children in Central Asian educational contexts.

Dialogic pedagogy, rooted in the Socratic tradition and elaborated by contemporary scholars including Mercer (2000), Alexander (2006), and Reznitskaya and Gregory (2013), posits that the quality of classroom talk — specifically, the extent to which it opens rather than forecloses cognitive possibility — exerts significant and measurable influence on children's higher-order thinking development. When questions invite children to speculate ('What would happen if...?'), elaborate ('Can you think of another way?'), or associate ('What does this remind you of?'), they activate the generative cognitive processes that underpin divergent thought.

The present study addresses three research questions: (1) Does a structured dialogic questioning programme produce statistically significant improvements in preschool children's divergent thinking as measured by the TTCT-F? (2) Which specific dimensions — Fluency, Flexibility, Originality, and Elaboration — are most responsive to dialogic questioning interventions? (3) What characteristics of educator questioning behaviour are most strongly associated with divergent thinking gains?

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2. LITERATURE REVIEW

Guilford's (1967) seminal distinction between convergent thinking and divergent thinking established the theoretical framework within which divergent thinking research has subsequently evolved. The Torrance Tests of Creative Thinking (Torrance, 1966) operationalise divergent thinking through four dimensions: Fluency (number of responses), Flexibility (variety of categories), Originality (statistical infrequency), and Elaboration (level of detail and complexity).

Evidence for the developmental malleability of divergent thinking in early childhood is substantial. Kim's (2011) meta-analysis of cross-temporal data revealed a significant decline in divergent thinking scores on the TTCT between early and middle childhood — a finding that underscores both the importance of the preschool window and the potentially deleterious effect of formal schooling on generative cognition when instruction prioritises convergent over divergent thinking.

Dialogic pedagogy theory provides the conceptual bridge between educator questioning practices and children's divergent thinking development. Alexander (2006) distinguishes between recitation (teacher asks, child retrieves, teacher evaluates) and dialogue (mutual construction of understanding through open-ended exchange), arguing that only the latter reliably produces higher-order cognitive engagement. Mercer's (2000) concept of 'exploratory talk' — in which participants offer, challenge, and build upon one another's ideas — maps closely onto the conditions most conducive to divergent thought.

Empirical evidence linking specific questioning practices to divergent thinking outcomes in preschool populations remains sparse. Robson and Rowe (2012) demonstrated that sustained shared thinking interactions were associated with higher scores on tasks requiring generative thinking. Walsh and Blewitt (2006) found that open-ended questioning during shared book reading significantly enhanced elaboration. The present study extends this evidence base by directly examining the effects of a structured dialogic questioning protocol on TTCT-F outcomes.

Within Uzbekistan's preschool context, pedagogical innovation research has examined structured creative play and activity-based models (Tashtemirova & Ahmadjonov, 2021), but the role of intentional questioning dialogue in divergent thinking development has not been previously investigated. The present study thus addresses a substantive gap in both the regional and international literature.

3. MATERIALS AND METHODS

A quasi-experimental pre-test / post-test control group design was employed. Participants comprised 72 children aged 4–6 years (M = 5.2 years, SD = 0.6) attending two preschool institutions in Qo'qon, Uzbekistan. Assignment to experimental (n = 36) and control (n = 36) conditions was made by institution to avoid within-institution contamination. All participants were native Uzbek speakers; children with documented developmental delays were excluded.

The experimental intervention consisted of a 10-week Dialogic Questioning Programme (DQP), delivered through three 30-minute small-group sessions per week. The DQP was structured around four question typologies: (1) Generative questions ('How many different ways could we...?'); (2) Speculative questions ('What might happen if...?'); (3) Associative questions ('What else is like this?'); and (4) Elaborative questions ('Can you tell me more about that?', 'Why do you think so?'). Educators delivering the DQP received a two-day training workshop prior to commencement, with fidelity monitoring through bi-weekly observation using a 15-item Educator Questioning Behaviour Checklist (EQBC; inter-rater reliability $\kappa = 0.84$). Control group educators continued standard instructional practice.

Divergent thinking was assessed using the Torrance Tests of Creative Thinking — Figural Form A (TTCT-F; Torrance, 1966), yielding standardised scores on all four dimensions. Assessments were administered individually by trained evaluators blind to group assignment at pre-test (Week 0) and post-test (Week 11). Independent-samples t-tests were used for between-group comparison; Cohen's d was calculated for effect size estimation.

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4. RESULTS

Groups demonstrated equivalence on all TTCT-F subscales at pre-test (all $p > .05$). Following the 10-week DQP, experimental group children demonstrated significantly higher post-test scores than control group peers across all four divergent thinking dimensions (Table 1).

Table 1. TTCT-F Post-Test Standardised Scores by Group (Mean ± SD)

Subscale	Experimental (n=36)	Control (n=36)	t-value	Cohen's d
Fluency	112.4 ± 10.2	98.7 ± 9.6	5.84***	0.87
Flexibility	108.9 ± 11.4	96.3 ± 10.8	4.92***	0.79
Originality	115.2 ± 12.1	99.4 ± 11.7	5.61***	0.92
Elaboration	106.7 ± 9.8	97.1 ± 10.3	4.13***	0.71

Note. All scores are standardised (M = 100, SD = 15). All post-test between-group comparisons significant at *** $p < .001$.

The largest effect size was observed for Originality ($d = 0.92$), the subscale most directly reflective of statistically infrequent, unexpected responses. Fluency yielded $d = 0.87$, Flexibility $d = 0.79$, and Elaboration $d = 0.71$ — all within the large effect size range (Cohen, 1988). EQBC fidelity scores indicated high programme adherence across sessions (M = 87.3%, range: 82–94%), confirming that observed outcomes are attributable to the intended intervention.

5. DISCUSSION

The results provide compelling evidence that a structured dialogic questioning programme, implemented with fidelity by trained early childhood educators, produces large and statistically significant improvements in preschool children's divergent thinking across all four TTCT-F dimensions. The breadth of effect — encompassing quantitative productivity (Fluency), cognitive variability (Flexibility), generative novelty (Originality), and structural elaboration (Elaboration) — suggests that dialogic questioning exerts influence on the full architecture of divergent thinking rather than a single surface-level output.

The dominance of Originality gains is theoretically coherent. Speculative and associative questioning types ('What might happen if...?', 'What else is like this?') directly activate the remote associative retrieval processes that Mednick (1962) identified as the cognitive substrate of original ideation. When children are repeatedly invited to consider unexpected connections and hypothetical possibilities, they engage in precisely the cognitive patterns that generate statistically infrequent, original responses.

The relatively smaller, though still large, effect on Elaboration warrants attention. Elaborative questioning requires not only generative capacity but also the metacommunicative skill of recognising that further specification is valued by the interlocutor — a pragmatic competence that develops gradually through the preschool years. A longer intervention or one incorporating explicit elaboration modelling would likely produce stronger Elaboration effects.

From a practical standpoint, the DQP's implementation simplicity is a significant strength. The programme requires no specialised materials; its core resource is the intentional, informed practice of the educator. This positions dialogic questioning as a highly scalable intervention, viable across diverse preschool settings including under-resourced contexts. The two-day professional development format achieved high fidelity (M = 87.3%), suggesting that modest investment in educator preparation is sufficient for effective programme delivery.

These findings carry direct implications for Uzbekistan's preschool education system, where dominant instructional models continue to favour convergent, reproductive activity formats over those designed to elicit generative child cognition. The systematic integration of structured dialogic questioning cycles within the State Preschool Education Standard presents both a pedagogically

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warranted and institutionally feasible pathway for enriching children's creative cognitive development on a national scale.

6. CONCLUSION

This study establishes that a structured dialogic questioning programme constitutes an empirically validated pedagogical approach for stimulating divergent thinking in preschool-age children. Large effect sizes across all four TTCT-F subscales confirm that intentional educator dialogue — characterised by generative, speculative, associative, and elaborative questioning — significantly enriches the quality and originality of children's cognitive output beyond what conventional preschool instruction produces. These findings extend dialogic pedagogy theory into the domain of divergent thinking development and offer a practically accessible, scalable framework for early childhood educators in Uzbekistan and analogous educational systems. Future investigations should examine the sustainability of effects at 6- and 12-month follow-up, the transferability of dialogic thinking gains to academic preparedness outcomes, and the differential responsiveness of children at varying developmental levels to distinct questioning typologies.

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