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DEVELOPING THE MEDIA COMPETENCE OF PRESCHOOL EDUCATORS IN THE IN-SERVICE TRAINING SYSTEM: RESULTS OF A PEDAGOGICAL EXPERIMENT

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Abstract

The accelerating penetration of digital media into early childhood education has made the media competence of preschool educators a decisive factor of professional effectiveness. Existing in-service training programmes, however, address media-related skills fragmentarily and rarely rest on a validated diagnostic framework. This article reports a three-stage pedagogical experiment (2023–2025) designed to test an organisational-didactic model for developing the media competence of preschool educators within the in-service training system. The sample comprised 632 educators from Tashkent city, Tashkent region and Namangan region, divided into an experimental group (EG, n = 316) and a control group (CG, n = 316). Media competence was operationalised through three components — motivational-axiological, content-related and procedural — each measured on a three-level scale. The experimental intervention consisted of a 72-hour special course combined with project-based, discussion-based and game-based media education technologies. At the ascertaining stage the groups were statistically homogeneous ($t = 0.424$; $p > 0.05$). At the control stage the difference between them became highly significant for every component ($t > 8.4$; $\chi^2 > 76.0$; $p < 0.001$). In the EG the share of educators at the high level rose from 10.1 % to 34.5 %, while the mean score increased from 2.75 to 3.63 points; in the CG the corresponding changes were 9.5 % to 12.7 % and 2.73 to 2.89. The effect size (Cohen's d = 0.697) indicates a practically meaningful impact. The findings support the proposed model and suggest that media competence develops most reliably when theoretical modules are integrated with sustained media production practice.

Keywords: Media competence, media education, preschool educator, in-service training, professional development, pedagogical experiment, media literacy.

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Introduction

The contemporary information environment has altered the conditions in which early childhood education takes place. Children encounter screen media long before they enter formal schooling, and the preschool educator is increasingly expected to mediate that encounter rather than merely avoid it. This expectation presupposes a specific professional quality — media competence — understood as the integrative capacity to select, critically interpret, and pedagogically appropriate media resources, and to produce media content for educational purposes.

The theoretical foundations of media education have been elaborated most systematically in the works of A. V. Fyodorov, who defines media competence as a combination of motivation, knowledge, skills and abilities enabling a person to select, use, critically analyse, evaluate, create and transmit media texts [1, p. 64]. Comparative analyses of national media education systems [2; 3] demonstrate that the integration of media education into teacher training has followed markedly different trajectories across countries, and the UNESCO survey of media education worldwide [13] documents the same divergence at the level of curricular provision. In Anglo-American scholarship, D. Buckingham has emphasised that media literacy in the digital age cannot be reduced to technical proficiency and necessarily involves cultural and critical dimensions [4, p. 199]; S. J. Baran situates this position within the broader theory of mass communication [14]. The UNESCO framework documents on information literacy [5] similarly treat critical engagement, rather than instrumental skill, as the core of media education.

In Uzbekistan, the informatisation of pedagogical education has been examined by U. Sh. Begimqulov [6], while S. S. Beknazarova has addressed media education in the preparation of teaching staff [7]. S. S. Babadjonov has investigated the development of media competence among higher education teaching staff, establishing both its theoretical and methodological foundations [8] and a system for its development through informatics and information technology courses [9]. N. Begmatova has developed methodological guidance for the use of multimedia technologies in preschool institutions [10], and N. S. Mo'minova has reported preliminary data on media competence specifically among preschool educators [15]. Diagnostic aspects of professional development

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have been treated by T. E. Klimova [11] and V. V. Afanasyev [12], whose work informed the instruments used in the present study.

Despite this accumulated body of work, three gaps remain. First, the majority of studies address school teachers or higher education staff, whereas the preschool educator — whose media practice is constrained by the developmental characteristics of children aged three to seven — has received considerably less attention. Second, media competence is frequently treated as an undifferentiated whole, which makes it difficult to establish which of its components respond to targeted intervention and which do not. Third, and most importantly, published accounts of in-service media training seldom report the statistical verification of group homogeneity prior to intervention, without which any post-intervention difference remains ambiguous in its causal interpretation.

The present study addresses these gaps. Its aim is to verify experimentally the effectiveness of an organisational-didactic model for developing the media competence of preschool educators within the in-service training system. Three research questions guided the enquiry:

— What is the initial level of media competence among preschool educators, and are the experimental and control groups statistically homogeneous prior to intervention?

— Does the proposed model produce statistically significant changes in each of the three components of media competence?

— Which component of media competence proves most and least responsive to the intervention, and what does this imply for the design of in-service programmes?

The working hypothesis was formulated as follows: if the development of media competence in the in-service training system is organised on the basis of the proposed organisational-didactic model, combined with an integrative modular methodology oriented towards active media production and supported by a defined set of pedagogical conditions, then the media competence of preschool educators will develop to a statistically significant degree across all structural components.

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2. Materials and Methods

2.1. Research design and participants

The study employed a quasi-experimental design with non-equivalent control group and pre-test/post-test measurement. The experiment was conducted between 2023 and 2025 at preschool education institutions and regional in-service teacher training centres in Tashkent city, Tashkent region and Namangan region.

The total sample comprised 632 preschool educators. Participants were allocated to an experimental group (EG, n = 316) and a control group (CG, n = 316). Allocation was made at the level of training cohorts rather than individuals, in order to preserve the integrity of the in-service programme; groups were subsequently matched on length of pedagogical service, qualification category and level of education. The distribution of participants is presented in Table 1.

Table 1 — Distribution of participants

Region	EG	CG	Total
Tashkent city	118	116	234
Tashkent region	104	106	210
Namangan region	94	94	188
Total	**316**	**316**	**632**

2.2. Operationalisation and instruments

Following the component structure established in the theoretical phase of the research, media competence was operationalised through three components. The motivational-axiological component reflects the educator's interest in media activity and recognition of its professional value. The content-related component covers systematic knowledge of media, media languages and media education. The procedural component comprises practical skills of media use and media production in work with preschool children.

Each component was assessed by a dedicated set of instruments: a structured questionnaire and self-assessment scale for the motivational-axiological component; a criterion-referenced knowledge test for the content-related component; and expert assessment of practical assignments together with structured observation for the procedural component. Expert assessment was carried out independently by two methodologists; disagreements exceeding one scale point were resolved by discussion.

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Results were interpreted on a three-level scale, the descriptors of which are given in Table 2.

Table 2 — Levels of media competence development

Level	Score range	Descriptor
High (creative)	4.1–5.0	Uses media technologies independently and creatively; analyses media texts critically; produces original media content; demonstrates sustained need for self-development
Medium (reproductive-critical)	3.0–4.0	Uses media resources following a given model; interprets media texts largely correctly but experiences difficulty with critical analysis; interest in media activity is situational
Low (initial)	2.0–2.9	Media skills are superficial; unable to evaluate media texts critically; insufficient awareness of the need for media education

2.3. Intervention

In the EG, in-service training was restructured according to the proposed model. Its core was a 72-hour special course, 'Developing the Media Competence of the Preschool Educator', comprising 24 hours of theoretical and 48 hours of practical work distributed across five modules: foundations of media culture and media education (10 h); critical analysis of media texts (14 h); methodology of media use in preschool education (18 h); media production technologies (18 h); and media safety and information hygiene (12 h).

The practical component drew on heuristic, game-based and problem-based media education technologies: a discussion film-and-video club, the business game 'Information-Organisational Model', defence of media projects, and the creation of interactive posters and educational video clips. Products created by participants were compiled into a portfolio and taken into account in the final assessment. Four pedagogical conditions were maintained throughout: orientation of the training process towards active media use; a balanced combination of collective, group and individual work; continuity between

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theoretical and practical stages; and regular psychological-pedagogical diagnostics and monitoring.

In the CG, in-service training continued according to the standard programme, which includes information technology content but does not incorporate systematic media education or media production practice.

2.4. Statistical analysis

Data were processed using descriptive statistics (mean score, standard deviation), Student's t-test for independent samples (comparison of EG and CG) and for paired samples (within-group dynamics), Pearson's χ^2 test for the distribution of levels, the coefficient of effectiveness (ratio of EG to CG mean scores) and Cohen's d for effect size. Mean scores were computed on a five-point scale with level weights of 2.0 (low), 3.5 (medium) and 4.75 (high). The significance threshold was set at $\alpha = 0.05$; for df = 630 the critical value of t is 1.964, and for df = 2 the critical value of χ^2 at $\alpha = 0.01$ is 9.21.

3. Results

3.1. Baseline equivalence of groups

At the ascertaining stage, the level of media competence was low in both groups. On the generalised indicator, 58.2 % of EG participants and 59.2 % of CG participants were at the low level, while only 10.1 % and 9.5 % respectively reached the high level. Comparison of the groups yielded $t = 0.424$ ($p = 0.672$), which is well below the critical value of 1.964. Component-wise values were likewise non-significant (motivational-axiological $t = 0.415$; content-related $t = 0.341$; procedural $t = 0.788$; all $p > 0.05$). The groups may therefore be regarded as statistically homogeneous prior to the intervention.

3.2. Component dynamics

Table 3 presents the distribution of levels across the three components at entry and exit.

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Table 3 — Distribution of levels by component, % (EG n = 316; CG n = 316)

Component / level	EG entry	EG exit	CG entry	CG exit	EG change
Motivational-axiological					
high	11.1	38.0	10.8	14.2	+26.9
medium	34.5	44.6	33.5	38.3	+10.1
low	54.4	17.4	55.7	47.5	–37.0
Content-related					
high	9.8	33.9	9.5	12.7	+24.1
medium	31.6	45.6	31.0	35.8	+14.0
low	58.5	20.6	59.5	51.6	–37.9
Procedural					
high	8.9	31.3	8.6	11.4	+22.4
medium	29.4	46.2	29.1	34.5	+16.8
low	61.7	22.5	62.3	54.1	–39.2

In the EG the proportion of educators at the high level rose by a factor of 3.4 for the motivational-axiological component, 3.5 for the content-related component and 3.5 for the procedural component. Changes in the CG were modest throughout, the high level increasing by 2.8 to 3.4 percentage points.

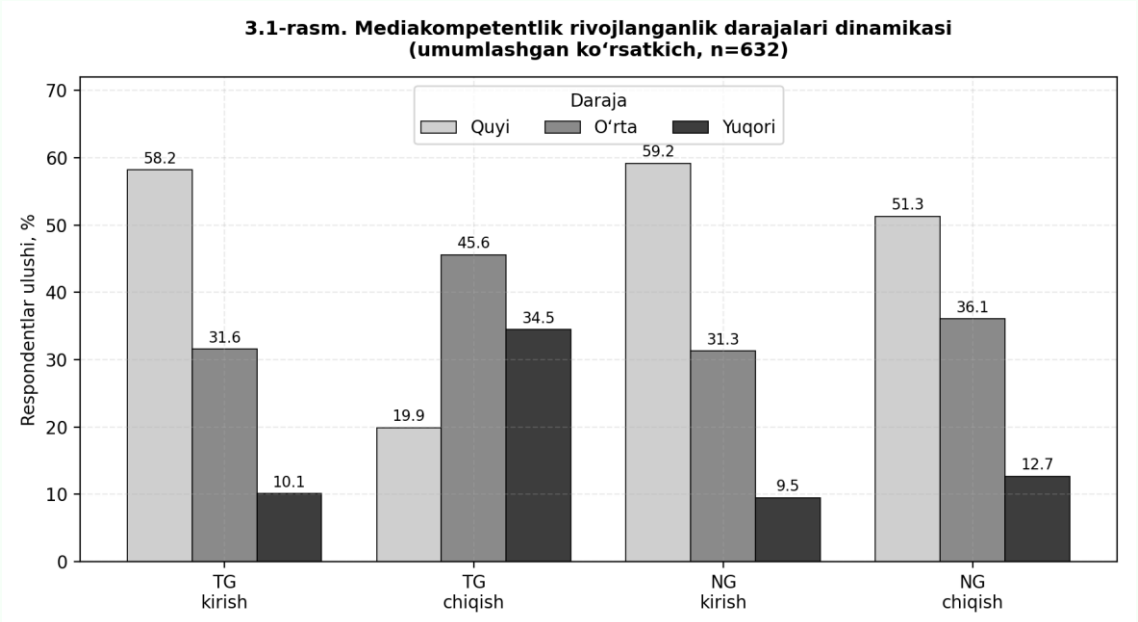

Figure 1 — Distribution of media competence levels, generalised indicator (n = 632)

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Figure 1 shows that the structure of the distribution in the EG was inverted over the course of the experiment: whereas the low level predominated at entry, the medium and high levels together accounted for 80.1 % at exit. In the CG the overall configuration of the distribution was largely preserved.

3.3. Mean scores

Mean scores by component are given in Table 4 and visualised in Figure 2.

Table 4 — Mean scores by component (five-point scale)

Component	EG entry	EG exit	CG entry	CG exit	EG gain
Motivational-axiological	2.82	3.71	2.80	2.97	+0.89
Content-related	2.74	3.62	2.73	2.88	+0.88
Procedural	2.69	3.56	2.67	2.83	+0.87
Generalised indicator	**2.75**	**3.63**	**2.73**	**2.89**	**+0.88**

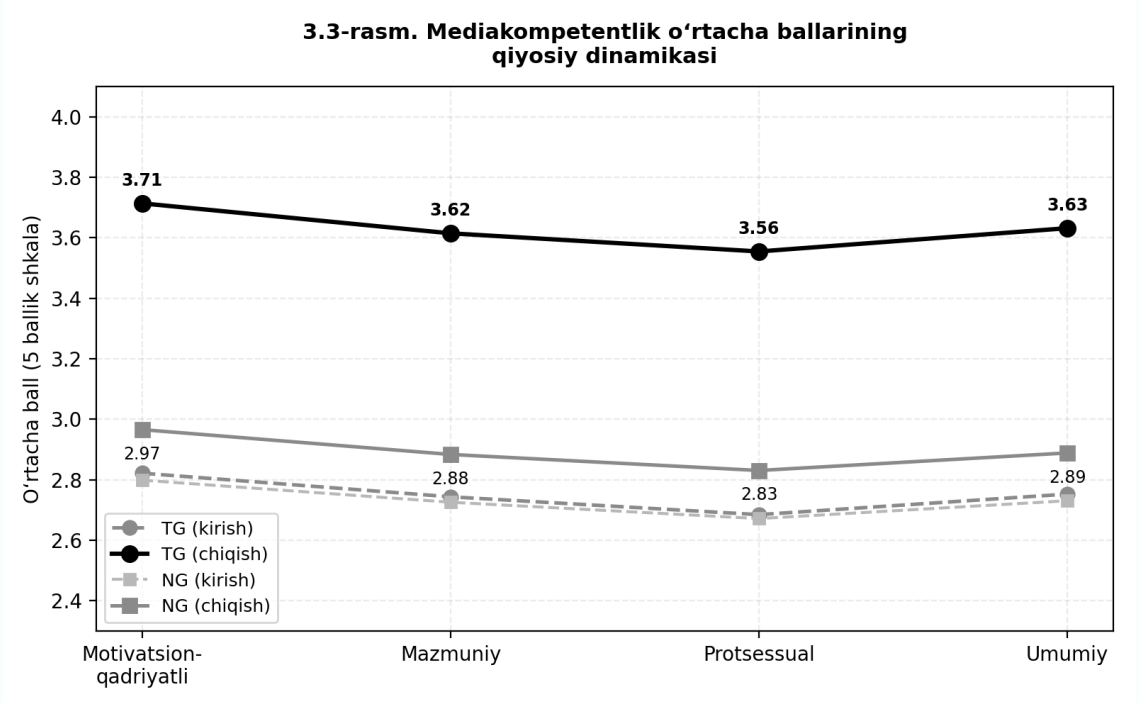

Figure 2 — Comparative dynamics of mean media competence scores

The gain in the EG was consistent across components, ranging from 0.87 to 0.89 points. In the CG the gain lay between 0.15 and 0.17 points, which falls within

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the range attributable to ordinary professional development over a two-year period.

3.4. Statistical verification

Table 5 summarises the inferential statistics.

Table 5 — Results of statistical testing

Component	t entry (EG–CG)	t exit (EG–CG)	χ^2 exit	Significance
Motivational-axiological	0.415	8.514	79.64	$p < 0.001$
Content-related	0.341	8.479	76.40	$p < 0.001$
Procedural	0.788	8.522	76.09	$p < 0.001$
Generalised indicator	**0.424**	**8.765**	**79.00**	**$p < 0.001$**

All entry-stage values fall below the critical threshold ($t < 1.964$), while all exit-stage values exceed it by a wide margin ($t > 8.4$). The χ^2 values likewise exceed the critical value of 9.21 by a factor of more than eight. Within-group analysis using the paired-samples t-test confirmed significant growth in the EG (generalised indicator $t = 18.658$; $p < 0.001$) and a smaller but detectable change in the CG ($t = 4.603$; $p < 0.001$).

Quality of attainment — the combined share of educators at the medium and high levels — rose from 41.8 % to 80.1 % in the EG (+38.3 pp) and from 40.8 % to 48.7 % in the CG (+7.9 pp). The coefficient of effectiveness increased from 1.008 at entry to 1.257 at exit. Cohen's d for the generalised indicator was 0.697, corresponding to a medium-to-large effect.

3.5. Summary of effectiveness indicators

Table 6 consolidates the principal outcome measures for both groups.

Table 6 — Generalised indicators of experimental effectiveness

Indicator	EG	CG	Difference
Quality of attainment, entry (%)	41.8	40.8	+1.0
Quality of attainment, exit (%)	80.1	48.7	+31.4
Gain in quality of attainment (pp)	+38.3	+7.9	+30.4
Mean score, entry	2.75	2.73	+0.02
Mean score, exit	3.63	2.89	+0.74
Coefficient of effectiveness, exit	1.257	—	—
Effect size (Cohen's d)	**0.697**	**—**	**medium-to-large**

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The contrast between the entry and exit rows of Table 6 is the central result of the study. At entry the two groups differed by 1.0 percentage point in quality of attainment and by 0.02 points in mean score — differences well within measurement error. At exit the same measures differed by 31.4 percentage points and 0.74 points respectively.

3.6. Ranking of component responsiveness

To establish which component responded most strongly to the intervention, the absolute gain at the high level was compared against the number of contact hours serving each component. Hours were attributed as follows: modules 1 and 5 (partly) to the motivational-axiological component; module 2 and half of module 3 to the content-related component; module 4 together with the remaining halves of modules 3 and 5 to the procedural component. The results are given in Table 7.

Table 7 — Component gain relative to instructional time (EG)

Component	Contact hours	Gain at high level (pp)	Gain per 10 h (pp)	Rank
Motivational-axiological	16	+26.9	16.8	1
Content-related	23	+24.1	10.5	2
Procedural	33	+22.4	6.8	3
Total	**72**	—	—	—

The ordering is inverse to the allocation of time: the component receiving the fewest hours produced the largest gain, and the component receiving the most hours produced the smallest. This relationship is discussed in Section 4.

4. Discussion

The results support the hypothesis. The critical feature of the design is the contrast between the two measurement points: the absence of a significant difference at entry ($t = 0.424$) together with a large difference at exit ($t = 8.765$) permits the observed change to be attributed to the intervention rather than to pre-existing group differences. This sequence — establishing homogeneity before claiming effect — is what distinguishes the present findings from studies that report only post-intervention comparisons.

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The component analysis yields a finding of practical significance. The motivational-axiological component showed the largest absolute gain at the high level (+26.9 pp), while the procedural component showed the smallest (+22.4 pp) despite receiving the greatest allocation of contact hours. When gain is normalised against instructional time (Table 7), the disparity widens: 16.8 percentage points per ten hours for the motivational component against 6.8 for the procedural — a ratio of approximately 2.5 to 1.

Two interpretations are plausible. The first is that motivation responds more rapidly to intervention because it requires the reorientation of existing attitudes rather than the accumulation of new skill; a single persuasive demonstration that media tools serve pedagogical ends may shift an educator's stance, whereas competent video editing cannot be acquired in one sitting. The second is that procedural competence has a lower attainable ceiling within a 72-hour programme, since production skills mature through repeated independent practice extending well beyond the course.

The second interpretation receives support from the entry data. The procedural component was already the weakest at baseline (61.7 % at the low level, against 54.4 % for the motivational component), indicating a pre-existing skills deficit that a short course can reduce but not eliminate. Were the ceiling explanation false, one would expect the additional hours devoted to production to have compensated for the lower starting point; they did not.

This pattern is consistent with Buckingham's argument that media literacy cannot be reduced to technical proficiency [4]: the motivational and critical dimensions proved the more tractable, whereas sustained production capability required longer engagement. It also accords with Fyodorov's treatment of media competence as an integrative rather than an additive quality [1], in that gains across the three components were closely aligned in absolute terms (0.87–0.89 points) rather than developing independently — a pattern that would be unlikely if the components were functionally separate.

For programme design, the implication is not that procedural hours should be reduced. The procedural component still gained 22.4 percentage points, and it remains the component on which classroom practice most directly depends. The implication is rather that procedural development should be restructured: distributed across a longer period, supported by follow-up consultation, and anchored in tasks that participants complete in their own institutions rather than

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in the training room. Time-efficiency figures of the kind reported in Table 7 are useful for diagnosing where a programme's returns are concentrated, but they should not be read as a direct prescription for reallocating hours.

The modest but statistically detectable growth in the CG ($t = 4.603$; $p < 0.001$) merits comment. It indicates that some development of media competence occurs through ordinary professional experience and exposure to institutional digitalisation, and it cautions against attributing the whole of the EG gain to the intervention. The quantity of interest is the difference between the two trajectories — 0.88 points against 0.16 points — rather than the EG gain considered in isolation. Studies reporting only single-group pre-post designs risk overstating intervention effects by a factor approaching five on these data.

Three limitations should be acknowledged. First, allocation to groups was made at cohort rather than individual level, so residual selection effects cannot be excluded, although baseline testing indicates these were small. Second, the procedural component was assessed partly through expert judgement, which carries a degree of subjectivity despite the use of independent assessors. Third, measurement concluded at the end of the programme; the durability of the observed gains remains untested. A follow-up measurement at twelve months would establish whether the changes persist, and this is the most immediate direction for further work.

Within these limits, the study contributes evidence that media competence in preschool educators is amenable to systematic development within existing in-service structures, and that the integration of theoretical modules with sustained media production practice is the mechanism through which this occurs.

5. Conclusion

A three-stage pedagogical experiment involving 632 preschool educators confirmed the effectiveness of the proposed organisational-didactic model for developing media competence within the in-service training system. The experimental and control groups were statistically homogeneous at entry ($t = 0.424$; $p > 0.05$), and the difference between them at exit was highly significant across all components ($t > 8.4$; $\chi^2 > 76.0$; $p < 0.001$).

In the experimental group the share of educators at the high level rose from 10.1 % to 34.5 % and the mean score from 2.75 to 3.63 points, against 9.5 % to 12.7 % and 2.73 to 2.89 points in the control group. Quality of attainment increased

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by 38.3 percentage points in the experimental group and by 7.9 points in the control group. The effect size (d = 0.697) indicates a practically meaningful impact.

Component analysis showed that the motivational-axiological component responds most readily to short-term intervention, whereas the procedural component, though improved, remains the weakest at exit. This suggests that in-service programmes should treat media production practice as a continuing rather than a course-bounded activity, and that follow-up support after the formal programme is likely to be necessary if procedural gains are to be consolidated.

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