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Article

Developing Logical and Analytical Thinking Through Pragmatic Tasks in Primary Education: Methodological and Empirical Findings

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Abstract: This article explores methodological opportunities for fostering logical and analytical thinking among primary school pupils through pragmatic tasks grounded in everyday situations. Particular attention is paid to interpreting a problem, selecting relevant information, comparing possible solutions, substantiating decisions, and drawing conclusions. The empirical material consists of classroom observations and diagnostic assessments conducted over three months with 180 pupils in grades 2–4 at three general education schools in Tashkent city and the Samarkand and Namangan regions. In the reported descriptive comparison, the experimental group outperformed the control group by 25 percentage points in analysis and generalization, 25 points in logical thinking, and 26 points in practical problem solving. Although these findings suggest the didactic promise of pragmatic tasks, limited information about baseline measurements, assessment instruments, and inferential analyses precludes definitive causal conclusions.

Keywords: Primary education; pragmatic tasks; logical thinking; analytical reasoning; intellectual education; problem situations; practical competence.

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1. Introduction

Intellectual development in primary school cannot be assessed solely by the amount of information pupils have acquired. Connecting ideas, identifying essential details in a problem, comparing causes and consequences, defending an argument, and checking an answer are equally important dimensions of learning. Alongside exercises that reproduce a familiar algorithm, primary education therefore needs tasks that invite pupils to investigate and reason independently.

Intellectual education encompasses the interconnected development of perception, attention, memory, and thought. Within this process, logical and analytical activity enables learners to distinguish the defining properties of objects, recognize relationships between given conditions and expected outcomes, and choose a defensible solution from several alternatives. These abilities are more likely to develop meaningfully when teaching materials are appropriate to pupils' age and familiar experiences.

In this study, a pragmatic task is understood as an educational assignment built around an authentic or realistic situation that requires both the application of previously acquired knowledge and a practically justified decision. Calculating the cost of purchases, planning daily activities, estimating the amount of material needed, or deciding how to

conserve resources can turn computation into purposeful action. Merely mentioning familiar objects, however, does not make a task pragmatic; its structure must create a genuine need to select, analyze, and evaluate an outcome.

The approach is consistent with several influential strands of educational thought. J. Dewey emphasized learning through experience and purposeful activity [1], while L. S. Vygotsky explained the developmental importance of interaction and collaboration [2]. J. Piaget's work draws attention to age-related cognitive capacities, and J. Bruner's scholarship emphasizes active discovery and the construction of understanding [3, 4]. Together, these perspectives support the organization of learning in which pupils actively construct solutions instead of merely receiving ready-made answers. Furthermore, modern evidence highlights the critical role of authentic problem solving in developing early executive functions [5] and mathematical literacy [6]. Together, these perspectives support the organization of learning in which pupils actively construct solutions instead of merely receiving ready-made answers.

Local studies on innovative, problem-based, and interactive methods in primary education also address the development of active thinking [7], [9]. Scholarship on cooperative learning and creative inquiry suggests that pragmatic tasks may function not only as individual computational exercises but also as opportunities for discussion and justification [10]-[13]. Recent empirical frameworks further underscore how inquiry-based learning environments cultivate problem-solving competencies in young learners [14], [15]. Nevertheless, the relationship between specific task features, particular cognitive abilities, and measurable assessment criteria requires further methodological clarification.

Accordingly, the article aims to explain how pragmatic tasks can support logical and analytical thinking, organize the available classroom evidence, and interpret that evidence with appropriate methodological caution. The guiding research question is: how do indicators of analysis, logical reasoning, and practical problem solving in a group using real-life problem-oriented tasks compare with those observed under conventional teaching conditions?

2. Materials and Methods

The study employed a review of pedagogical literature, classroom observation, conversations with pupils, diagnostic tasks, tests, questionnaires, and descriptive comparisons. The available numerical indicators were examined comparatively rather than as a full inferential data set. Because the investigation relied on established classroom groups, its design should not be characterized as a randomized experiment.

The fieldwork involved pupils in grades 2–4 at three general education schools located in Tashkent city and the Samarkand and Namangan regions. Sixty pupils participated from each school, producing a total sample of 180. Teaching was observed over three months: conventional classroom procedures continued in the control groups, whereas the experimental groups worked with pragmatic tasks based on everyday situations. The available materials do not specify the number of pupils in each group, the exact selection procedure, or the complete distribution of baseline scores.

The work can be described in three interconnected stages. First, the psychological and pedagogical foundations of pragmatic assignments were considered and age-appropriate situations were selected. Second, practice-oriented problems were integrated into lessons while observations and diagnostic activities were conducted. Third, the resulting indicators were organized, the groups were compared, and pedagogical interpretations were developed.

Four criteria guided task design: realistic context, the requirement for active cognitive engagement, scope for exploring defensible alternatives, and suitability for learners' age and preparation. Taken together, these characteristics require pupils to

understand the circumstances, disregard irrelevant information, choose appropriate operations, and reconsider the calculated result in relation to the original situation.

The assignments were not confined to mathematics. Examples included estimating household expenditure in mathematics, choosing ways to reduce water consumption in natural science, and proposing a justified response to a problem described in a text during language lessons. Across subjects, the defining instructional feature was the expectation that pupils would reason about a situation and explain a choice rather than repeat a predetermined procedure. The reported findings therefore concern a cross-curricular application of pragmatic tasks.

The instructional logic of a pragmatic task can be organized into four successive actions: identifying the problem and intended goal; selecting information and representing the situation in a workable model; calculating, comparing, or testing possible approaches; and finally checking the practical validity of the answer and justifying it. This sequence offers a methodological description of the activities reported. No separate experimental evidence is available to establish the independent effectiveness of the four-step sequence itself.

Three principal outcomes were selected for comparison: analysis and generalization, logical thinking, and practical problem solving. The source materials refer to diagnostic tests and psychological questionnaires linked to a 100-point assessment framework. They do not, however, provide the full task instruments, operational definitions of each indicator, detailed scoring rubrics, or evidence of measurement reliability. The figures are therefore presented as descriptive indicators only.

Between-group differences were expressed in percentage points for each criterion. For instance, the difference between 83% and 58% is 25 percentage points, not a 25% relative increase. This calculation clarifies the comparison but does not by itself establish statistical significance or causal impact. Stronger conclusions would require exact group sizes, individual baseline and follow-up scores, measures of variability, and appropriate statistical tests.

3. Results

The comparative indicators show higher reported values in the experimental group across all three primary dimensions of cognitive activity. Analysis and generalization were reported at 83% in the experimental group and 58% in the control group, a difference of 25 percentage points. For logical thinking, the corresponding figures were 86% and 61%, again yielding a difference of 25 percentage points.

Practical problem solving was reported at 81% in the experimental group and 55% in the control group. The resulting 26-percentage-point gap was the largest difference among the three main criteria. The rounded overall averages in the available summary were 83% for the experimental group and 58% for the control group. These averages represent descriptive summaries of the displayed criteria; they should not be mistaken for mean scores calculated from each pupil's individual final test.

Table 1. Reported indicators of cognitive activity in the control and experimental groups

Assessment criterion	Control group	Experimental group	Difference
Analysis and generalization	58%	83%	+25 pp
Logical thinking	61%	86%	+25 pp
Practical problem solving	55%	81%	+26 pp
Overall average (rounded)	**58%**	**83%**	**+25 pp**

The differences across the three criteria are similar in magnitude: 25 percentage points for two criteria and 26 points for the third. Figure 1 illustrates the corresponding comparison between groups. The chart makes the observed differences visible but adds no information about confidence intervals, individual pupil scores, or sampling uncertainty.

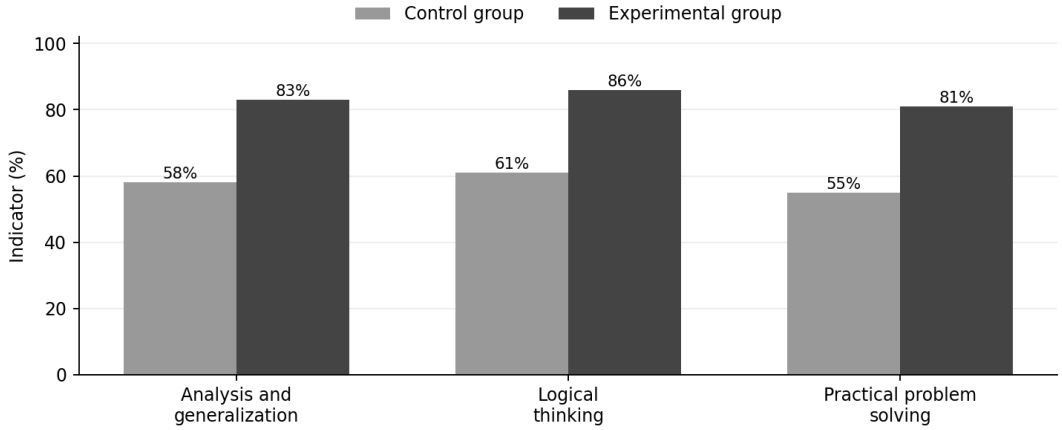


Figure 1. Comparison of experimental and control groups on three assessment criteria.

Classroom observations also reported that 78% of pupils in the experimental group, compared with 52% in the control group, demonstrated independent analysis, recognition of cause-and-effect relationships, and reasoned conclusions. This corresponds to a 26-percentage-point difference. Since the threshold or scoring rubric used to determine these proportions was not specified, the result must also be interpreted cautiously.

The materials additionally mention an average 28% improvement in thinking speed and analytical performance among experimental-group pupils. However, neither the baseline against which this increase was calculated nor the calculation procedure and relevant dispersion measures are reported. Consequently, the 28% figure cannot be treated as equivalent to the 25–26-percentage-point between-group differences or as sufficient proof of a well-established developmental trajectory.

Observation notes further associate work on pragmatic tasks with more active participation in classroom discussions, stronger attempts to explain personal reasoning, and consideration of alternative solutions. Situations involving household budgets and environmental conservation encouraged pupils to connect what they had learned with familiar experiences. These observations provide useful pedagogical context for the numerical indicators but are not a substitute for standardized outcome measures.

The available data primarily describe group-level outcomes at the end of the observation period. Complete evidence of baseline equivalence and longitudinal individual development is absent. Accordingly, the findings are best reported as descriptive observations of higher indicators in the setting where pragmatic tasks were used, rather than as definitive proof that this instructional approach alone produced the differences.

4. Discussion

The descriptive findings suggest that practice-oriented assignments can create favorable instructional conditions for cognitive engagement. In a conventional arithmetic exercise, the required operation is often indicated in advance. In a realistic task, pupils must first determine which information matters, what needs to be found, and what constraints a useful answer should satisfy. Computation thereby becomes a means of making a reasoned decision rather than an end in itself.

Consider the task of deciding whether a planned purchase fits within a budget. Adding prices alone does not complete the learning activity. A pupil must understand the spending limit, identify relevant information, calculate several combinations of items,

compare them, and explain which choice is preferable. Arithmetic thus operates alongside planning, analysis, and justification, consistent with the principle of learning through purposeful experience [1].

The developmental value of a task depends less on the presence of everyday vocabulary than on the thinking actions it requires. Words such as "shop," "journey," or "home" do not automatically turn an exercise into a meaningful problem. Requests to select evidence, compare strategies, identify an incorrect assumption, verify a conclusion, or explain a choice are more important in making an assignment genuinely pragmatic.

Age appropriateness is another essential instructional requirement. Familiar measurements, time, distance, money, household objects, and simple daily decisions provide accessible entry points for younger learners. The linguistic complexity of the task, the difficulty of the numbers, and the demand for independence should not all increase abruptly at once. Visual models, concrete demonstrations, or paired discussion can be introduced first, followed by progressively greater opportunities for independent analysis [2–4].

Group discussion supports listening, exchanging perspectives, and building arguments. Yet if a small number of confident pupils produce the entire solution, others may remain cognitively passive. A useful balance is to combine collective discussion with a brief individual explanation, a personal choice of strategy, or an independent check of the proposed answer. Such a structure is consistent with perspectives on cooperative learning [8].

Assessment should not stop at recording whether the numerical answer is correct. It should also examine how accurately pupils interpreted the situation, selected essential facts, carried out their reasoning, checked alternatives, and defended their conclusion. Developing graded rubrics with clear performance descriptors and checking whether different assessors apply them consistently would strengthen transparency and comparability.

Several methodological limitations warrant explicit attention. The procedure used to assign participants to groups and the precise size of each group are unspecified, while information about diagnostic tasks, scoring thresholds, and measurement reliability is incomplete. Baseline scores, variance estimates, confidence intervals, and significance tests were not provided. The persistence of any differences beyond the three-month observation period is also unknown.

These limitations do not rule out a beneficial role for pragmatic tasks, but they prevent attributing the experimental group's advantage exclusively to the intervention. Differences in prior attainment, teaching practices, or classroom environments, for example, cannot be isolated using the information supplied. It is therefore more defensible to report that favorable differences were observed than to claim that effectiveness was statistically established.

Future research should involve groups that are comparable in age and prior achievement, clearly documented baseline and follow-up assessments, and statistical analyses based on individual data. It would also be valuable to study mathematics-specific pragmatic tasks separately from cross-curricular assignments. Such comparisons could help identify which task characteristics are most closely associated with analysis, logical inference, and practical decision-making.

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6. Conclusion

Pragmatic tasks offer a didactic means of connecting primary school knowledge with real activity and organizing purposeful reasoning. Their value lies not simply in their

everyday context but in the demands they place on pupils to interpret a problem, select information, evaluate options, check an answer, and justify a decision. The quality of such an assignment therefore depends on both its realistic relevance and the cognitive processes it engages.

The descriptive comparison of the available empirical data showed differences favoring the experimental group of 25 percentage points in both analysis and generalization and logical thinking, and 26 percentage points in practical problem solving. Although educationally noteworthy, these gaps cannot be interpreted as definitive causal evidence because information on initial group characteristics, assessment instruments, and statistical verification is insufficient.

In practice, teachers are advised to select tasks that reflect familiar situations, fit pupils' developmental level, require several forms of reasoning, and allow learners to verify their conclusions independently. Future studies should assess these instructional conditions with explicit rubrics and test their effects over longer periods using fully documented diagnostic procedures.

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