The OSCAR PUBLISHING Services
International Journal of Pedagogics

VOLUME Vol.05 Issue10 2025
PAGE NO. 26-30
DOI 10.37547/ijp/Volume05Issue10-03

Ensuring The Learning Activity Of Primary Teachers Using The Heuristic Method As A Social-Methodical Problem

Abdiyazova Sarvinoz Atadjanovna
Independent researcher of Urgench State University named after Abu Rayhon Beruni, Uzbekistan

Received: 12 August 2025; **Accepted:** 08 September 2025; **Published:** 10 October 2025

Abstract: The article analyzes the issue of ensuring the educational activity of primary school teachers as a socio-methodological problem based on the stages of the heuristic method (creating a problem situation, putting forward a hypothesis, theoretical justification, experiment and reflection). The research used a mixed approach, and a diagnostic questionnaire, lesson observation (based on rubrics), as well as semi-structured interviews were conducted with the participation of a primary school teacher. The results showed that the systematic introduction of heuristic tasks, open-ended question-and-answer formats, problem situations and small studies significantly increased the cognitive activity of teachers, reflexive skills and the creativity component in lesson design.

Keywords: Primary education; problem situation; reflection; creative thinking; methodological research; formative assessment; lesson design; professional development.

Introduction: 21st century education sees the teacher not just as a provider of knowledge, but as a partner who guides research, poses problems, and finds solutions together. The primary education stage is the “testing ground” of this approach: here, even the smallest details of the lesson directly affect the child’s thinking, the classroom climate, and the pace of development of the school. Therefore, the educational activity of a primary school teacher — that is, the ability to search for innovation, experiment, reflect, put conclusions into practice, and turn this process into a continuous cycle — is not only a matter of personal skill, but also a need at the level of a social order. Meeting this need, in turn, is a complex issue that is solved at the intersection of social (institutional culture, communities, leadership support) and methodological (didactic solutions, assessment, lesson design technologies) factors.

The heuristic method — a research cycle consisting of the stages of creating a problem situation, putting forward a hypothesis, checking and reflexive generalization — acts as a natural “motor” for awakening and stabilizing the teacher’s learning activity. Because heuristics encourage the teacher to abandon ready-made recipes and start the lesson with questions, justify his didactic decisions through small studies and verify his practice with evidence. In such a process, the teacher acts as a researcher, designer and facilitator at the same time: he clearly states the problem, formulates a hypothesis, collects evidence through observation in the lesson and formative assessment, and then transforms the conclusion into a lesson model or a bank of tasks. At the same time, the teacher’s heuristic research is not covered as an activity of a single subject: it is closely related to methodological communities, a coaching system, joint analysis sessions, a culture of lesson observation, and even the school’s assessment policy. So, the issue is essentially socio-methodological: learning activity stabilizes only when the social conditions that encourage the teacher to search (no fear of mistakes, cooperation, open communication) and the methodological infrastructure that provides it methodologically (heuristic task constructor, assessment rubrics, reflection protocols) complement each other.

In practice, however, many obstacles arise: the severity of the course load, the pressure of accountability, assessment practices aimed at the “correct answer”, the fragmentation of methodological resources, the lack of time and mentoring. These factors form habitual strategies in the teacher’s mind that reduce risk, but stifle creativity. The heuristic method helps to break this inertia, achieve great growth with little risk: the

teacher conducts a micro-experiment, quickly collects evidence, turns the error into a source of information, and discusses the result with colleagues.

The scientific problem of the article is that many initiatives to increase the learning activity of primary school teachers stop at separate trainings or one-time seminars; they are not deeply embedded in the daily practice of the teacher. Our approach sees the heuristic method as a process: a single cycle that applies to all stages of the lesson, from designing, conducting, observing, analyzing, redesigning. In this case, the result of heuristic activity — a lesson model, task template, assessment criteria — is accumulated in collegial discussion and open resource platforms, becoming community knowledge. The research is ideologically based on the principles of competency-based education, constructivist pedagogy, and reflective practice. Learning activity in this context is a broader concept than personal motivation: it is a set of competencies for analytical thinking, problem-solving, evidence-based decision-making, collaborative experimentation, and self-evaluation. The heuristic method is interpreted as a mechanism that connects these competencies into a single cycle.

The purpose of this work is to conceptually substantiate the socio-methodological conditions for ensuring the educational activity of a primary school teacher based on the heuristic method, develop practical mechanisms, and propose a system of indicators indicating their effectiveness. Accordingly, the following tasks are set: clarify the operational definition of the concept of educational activity; develop models for integrating the heuristic cycle (problem - hypothesis - verification - reflection - redesign) into teacher practice; analyze the interaction between social support (community, mentoring, assessment policy) and methodological infrastructure (resources, rubrics, protocols); present a package of practical recommendations and assessment indicators.

Thus, the article reveals the issue of ensuring the learning activity of primary school teachers against the background of global challenges in education as a socio-methodological problem and justifies the heuristic method as a conceptual and practical solution to this problem. The following chapters will provide a detailed description of the theoretical foundations, methodological approach, experimental results and their analysis, as well as instructions for implementing the recommended models and tools.

METHODOLOGY

This study was built on the basis of a mixed-method approach to reveal the role of the heuristic method in ensuring the learning activity of primary school teachers in a socio-methodological context. The choice of approach is due to the multifaceted nature of this issue: it is not enough to measure how the heuristic cycle works only with numerical indicators, it is also determined by the quality of communication, cooperation, reflection and design decisions in the teacher's practice. Therefore, while qualitative data (observation, interview, document analysis) describe the teacher's heuristic activity as a "live process," quantitative data (questionnaires, rubric scores, learning outcomes dynamics) reliably demonstrate the impact of this process.

The methodological framework is centered on the "heuristic cycle" (problem—hypothesis—verification—reflection—redesign); the research design is aimed at implementing this cycle in three iterative stages and recording the impact of socio-methodological conditions (collaborative analysis sessions, coaching, assessment policies) at the end of each stage. Each stage covered 6–8 weeks: the first week was spent creating a problem situation and developing a hypothesis, the intermediate weeks were spent collecting mini-experiments and formative evidence, and the final weeks were spent reflecting and redesigning. Methodological community meetings were held between cycles, during which assignment templates and observation data developed by teachers were discussed collegially; this process formed a natural mechanism of social support.

The participants consisted of 60 teachers teaching grades 1–4 in 4 general secondary schools, who were divided into experimental and comparison groups. The experimental group received a short module on the heuristic method (24 academic hours) and ongoing coaching (once every two weeks, 60 minutes); the comparison group continued with the current methodological practice. Contextual factors (level of openness of the school environment, leadership support, traditions of cooperation with colleagues) were pre-diagnosed and taken into account as covariates in the subsequent analysis. Data collection tools were developed taking into account the multidimensionality of the research problem. First, the "Heuristic Activity Index" (EFI) was developed, operationalizing the teacher's teaching activity: it assessed four components — problem-setting skills, hypothesis development and justification, evidence collection and analysis, reflection and redesign — using a 4-point rubric. Rubric items were completed through triangulation from lesson observations (a 40-minute full observation script), lesson plans and task sets ("lesson artifacts"), and reflection notes. Second, a 5-point Likert-scale "Preparation and attitude to heuristic practice" questionnaire was developed for teachers; it

covered subscales such as motivation, risk management, openness to collaboration, and evidence-based decision-making. Third, semi-structured interviews (at the end of each cycle) and "think-aloud" protocols were used for qualitative data; they revealed cognitive strategies in planning and real-time adaptation of heuristic tasks. Fourth, transcripts of community meetings and normative documents on school assessment policies were analyzed to capture socio-methodological factors. Data analysis was conducted in two directions. In the quantitative layer, pre-post differences in EFI scores and questionnaire measures were tested with a paired t-test or Wilcoxon test when not normal; ANCOVA was used for between-group differences, controlling for baseline and context covariates. Effect sizes (Cohen's d) and confidence intervals were provided; internal consistency across rubric items was tested using Cronbach's $\alpha \geq 0.70$. Cohen's κ was calculated for interrater agreement, and $\kappa \geq 0.60$ was accepted. In the qualitative layer, thematic coding identified "stuck points" in the heuristic cycle (e.g., generality of problem formulation or ambiguity in evidence interpretation) and strategies to overcome them (microexperimentation, question reformulation, collaborative planning with a colleague). The qualitative-quantitative integration was carried out in an "explanatory sequential" scheme: first, a clear effect size was found, then it was explained with qualitative evidence.

A number of measures were taken to ensure reliability and validity. Triangulation (by source, method and assessors), member checking, and peer debriefing were carried out. Consistent recording of data and procedures increased the reproducibility of the study; description of the context and indication of limitations allowed for an assessment of the transferability of the results. Ethically, written consent was obtained from participants, anonymity was guaranteed, and video observations were stored for pedagogical analysis purposes only, with limited access. The methodology examines the heuristic method as a "process that works in teacher practice": it is not just an idea in training, but a systematic activity that is linked to real-world problems and decisions, reinforced by community support and assessment policies. It is this integrated view that determines the conceptual novelty and practical usefulness of this research.

DISCUSSION

The results of the study confirmed the need to view the heuristic method not as a separate "method" in ensuring the educational activity of the primary school teacher, but as a process that operates at the intersection of social and methodological factors. Starting the lesson with a question, putting forward a hypothesis, collecting evidence and reflecting - all this is stabilized not only by the individual skills of the teacher, but also by conditions such as a culture of collaborative analysis, coaching, assessment policy, time and resources. Thus, the problem is essentially socio-methodological: without a "network" of motivation and support that activates the heuristic cycle, the method itself will remain at the level of short-term innovation.

First, the heuristic approach changes the epistemic position of the teacher: rather than quickly finding the "right answer", it is valued to clearly state the problem and try out a solution based on evidence. Observations and interviews showed that when lessons are designed in the logic of "questioning - hypothesizing - testing - concluding", the teacher makes decisions based on evidence, not on intuitive experience. This turns learning activity from random "inspiration" into a sustainable way of working.

Secondly, a dynamic analysis of the components of the Heuristic Function Index (EFI) showed that the most significant shifts occur in the stages of evidence collection and analysis and reflection-redesign. In the initial stages, many teachers allowed generalizations in the formulation of the problem ("students are weak in the lesson"), and often interpreted the evidence based on intuition. During the iterative cycles, the practice of "microexperiments" (small, measurable, quick tests) and question reformulations removed these bottlenecks: the problem was translated into a more operational definition ("speed in 3rd graders is low on multiplication combinations such as 6×8, 7×9"), and the evidence was reinforced with rubrics and formative assessments. Thus, the heuristic method served to transform creativity from a "random discovery" to a systematic design.

Third, the effect of social support was evident. In an environment with regular methodological community meetings and coaching sessions, teachers redesigned heuristic tasks more quickly and confidently. In the "going it alone" condition, the heuristic cycle relied more on individual effort and was slower to become a stable habit. In particular, peer observation and collegial analysis (class notes, artifacts, rubrics) helped the teacher to see mistakes and uncertainties as learning resources rather than "personal flaws." This cultural shift increased the social "power" of the heuristic method.

Fourth, coherence with assessment policy proved to be a crucial factor. The recognition of formative assessment, "portfolios of evidence," and observation rubrics at the school level gave legitimacy to heuristic practice. Conversely, in an environment governed

solely by summative results, the teacher refrains from taking risks, since heuristic experiments can temporarily produce "uneven" results. Here, an important danger was also observed: the overly bureaucratic use of rubrics can turn creative exploration into a formal checklist. Therefore, the teaching that the rubric is "a mirror rather than a map"—that is, it does not guide, but rather accurately reflects the situation—became an important conclusion for methodological policy.

Fifth, workload and time resources were seen as constraints on the sustainable implementation of the heuristic cycle. To overcome this, the strategy of "Minimal Viable Experiment (MVE)" – testing a single element of the lesson (for example, an introductory question or a final reflection) – proved effective. MVE allowed the teacher to see results quickly with little risk, gather evidence, and expand at a later stage. Also, a collective task bank and common "reflection templates" reduced cognitive load and turned the heuristic approach into a reusable infrastructure. Sixth, the differential manifestation of the effect is also worth discussing. Teachers with more experience showed an advantage in developing hypotheses and real-time adaptation in the lesson, but for them it was also necessary to systematize the written fixation of the evidence and generalization. New teachers, on the other hand, mastered the heuristic process faster, relying on more specific scripts and ready-made protocols; later they began to increase their flexibility. Differences were also observed by grade: in grades 1–2, "problematizing" questions with visual and game elements was effective, while in grades 3–4, fixing the hypothesis and evidence with short notes in mathematical language strengthened the result.

Seventh, the stability of the heuristic method is better ensured in a three-layer architecture: (a) Micro - lesson design and task construction (question–hypothesis–verification–reflection); (b) Meso – methodological community and mentoring (peer review, exchange of artifacts, MVE calendar); (c) Macro – school policy (recognition of formative assessment, time planning, access to resources). Without continuity between these layers, heuristic practice does not go beyond "enthusiasm". When coherence is ensured, the teacher moves to double-loop learning – reconsidering not only the lesson, but also his own decision principles.

Eighth, when considering the broader social impact of the method, we see that heuristic practice positions the teacher not only as a "methodological performer", but also as a member of a knowledge-creating community. The open exchange of lesson artifacts, discussion of small-scale studies and a common resource base reinforce the "teacher-researcher" identity within the school. This, in turn, increases professional motivation and responsibility, normalizes learning activity at the institutional level.

In practical terms, the discussion suggests the following directions: (1) embedding a short but highly intensive module on the heuristic method into the school's internal PD (professional development) system; (2) scheduling biweekly 60-minute peer review sessions linked to the MVE calendar; (3) collecting lesson artifacts and rubrics into a shared resource bank; (4) explicitly recognizing formative assessment in school policy; (5) integrating EFI indicators into teacher portfolios and coaching conversations; (6) offering a scripted starter kit for new teachers and flexible design approaches for experienced teachers. In conclusion, the heuristic method is a powerful mechanism for moving teacher learning from "random peaks of activity" to a sustainable cycle of practice. However, this mechanism only works at its full potential when combined with social support and a methodological infrastructure. The results of the discussion show that the simultaneous integration of the heuristic cycle with lesson design, community practice and school policy is the most realistic and sustainable way to ensure the educational activity of the primary school teacher. This integration turns the heuristic method into a culture, not a campaign.

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