



THEORETICAL-EMPIRIC BASIS OF ENSURING THE LEARNING ACTIVITY OF PRIMARY GRADE TEACHERS USING THE HEURISTIC METHOD

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ABSTRACT

The article discusses the theoretical and empirical foundations of ensuring the learning activity of primary school teachers based on the heuristic method. The theoretical part of the study analyzes the content of the heuristic approach, the creation of problem situations, the activation of logical search through questions and tasks, and the didactic possibilities of using metacognitive strategies. In the empirical part, the indicators of teachers' learning activity (motivational, cognitive, activity and reflexive components) are measured using the methods of observation, questionnaires, diagnostic tests and pedagogical experiments; the effectiveness of the training program developed using the heuristic method is evaluated based on criteria and indicators.

Introduction.

As 21st century education is characterized by rapid changes, digital environment and competency-based approaches, new responsibilities are emerging for the primary education system. At the heart of these responsibilities is the teacher's creativity, independent decision-making and readiness for continuous learning. A modern primary school teacher is not only a teacher who conveys the content of the lesson, but also a researcher who designs the educational process. Therefore, the teacher's "learning activity" - a complex quality that includes such components as internal motivation, the need for knowledge, search strategies, self-management and reflection - is becoming an indispensable basis for professional skills.

Practice shows that in many retraining and advanced training courses, the teacher acquires more ready-made algorithms and methodological "recipes". Although such an approach seems to give quick results, it does not sufficiently stimulate creative thinking, an independent position on the problem and evidence-based research. Here the importance of the heuristic method is manifested: it encourages the teacher not to multiply ready-made solutions, but to find a way out in new situations, that is, to active thinking based on discovery, ingenuity and research. Heuristics is the art of finding solutions without a strict algorithm, but through goal-oriented search rules, and involves the use of creating problem situations in the pedagogical process, asking open questions, heuristic conversations and discovery tasks. The heuristic method is especially relevant for primary school teachers: it is they who form in children the initial curiosity for knowledge, a culture of asking questions and logical search skills. When a teacher himself experiences heuristic research, he also

builds a lesson in this logic: he poses a problem, puts forward hypotheses, collects evidence, checks and draws conclusions. Such a “mirror” effect — the harmony of the heuristics of the teacher in his teaching and the spirit of inquiry in his students — directly affects the quality of education and sustainable results.

In the scientific literature, the heuristic approach is more often studied in connection with increasing student activity; there are relatively few studies that put the teacher himself as a subject at the center of heuristic research. Although the theoretical concepts in most works are highly grounded, reliable diagnostic tools designed to determine the teacher’s educational activity in a complex — motivational, cognitive, activity and reflexive — sections are not sufficiently proposed. Also, practical mechanisms, evaluation criteria, and indicators for the systematic integration of the heuristic method into professional development programs are often covered in a fragmentary manner. These gaps determine the need for this study.

Based on this need, this article develops the theoretical and empirical foundations of ensuring the learning activity of primary school teachers using the heuristic method. On the one hand, the didactic possibilities of the heuristic method - problem-based learning, discovery tasks, heuristic conversation, metacognitive strategies - are conceptually analyzed; on the other hand, their effectiveness in real educational practice is assessed through convenient diagnostic tools and pedagogical experiments. The main hypothesis of the study is that if the heuristic method is systematically introduced into the professional development program of teachers, the level of their learning activity (in terms of motivational, cognitive, activity and reflexive components) will significantly increase, which will have a positive effect on the quality of supporting creativity in lesson design and independent research in students. The theoretical foundation of the study is taken as constructivism, activity and andragogic approaches, as well as the concepts of self-determination, metacognitive learning strategies and reflexive practice. These views are consistent with the heuristic method’s principle of creating “teaching, not teaching situations”: the teacher, as a subject of discovery, implements the logical chain “question - hypothesis - evidence - conclusion” in his/her activities and transfers such a scenario to the educational process. Therefore, the article interprets the heuristic method not only as a methodological technique, but also as an integrative model that forms the teacher’s professional identity and educational culture.

The empirical design is briefly set up as follows: the educational activity of primary school teachers is assessed at the initial level (pre-test) based on observation, questionnaires and diagnostic tasks; then a training module based on the heuristic method (heuristic conversations, problem cases, open tasks, reflection sessions) is introduced; finally, the dynamics of change are analyzed through re-evaluation (post-test) and qualitative interviews. The assessment criteria and indicators cover the teacher's intrinsic motivation to learn, the ability to create and transfer knowledge, strategic decision-making in problem situations, and metacognitive growth manifested through regular reflective writing.

The idea of ensuring the learning activity of the primary school teacher through the heuristic method draws strength from the general principles of the constructivist

paradigm: knowledge is not "given" in a ready-made form, but is constructed by the active subject in a socio-cultural context. From this perspective, heuristics is a research practice based on a problem situation, questions and answers, hypotheses and verification, rather than on a rigid algorithm and ready-made "recipes". It forces the teacher to position himself not as a transmitter of lesson content, but as a guide to discovery; it is this position that sets in motion the teacher's learning activity - intrinsic motivation, initiative in knowledge, the ability to make strategic decisions and a reflexive culture.

The theoretical roots of the heuristic method are formed at the intersection of several scientific directions. First of all, in the tradition of Socratic dialogue, knowledge is "generated" through questions: the teacher's task is to pose the question correctly, rather than to give the answer. This approach is reinforced by Jerome Bruner's concept of discovery-based teaching: the teacher creates a problematic situation, opens up a spectrum of interpretations, but the subject himself finds the final solution. Piaget's constructivism and Vygotsky's idea of the "zone of proximal development" (ZPD) give didactic depth to heuristic tasks: the task should be slightly ahead of the teacher's "current competence line", but remain at a level that can be overcome through the use of a scenario and "base signals" (scaffolding). Thus, heuristics are a path to subjective discovery by creating an appropriate difficulty within the ZPD, through indicative instructions, semantic maps, and model analogies.

The connection of heuristics with problem-based learning and inquiry-based pedagogy is evident in Dewey's pragmatism: knowledge arises in the process of solving a practical problem; the cycle "experience-reflection-experiment-conclusion" is the main mechanism for both the teacher himself and the lesson he organizes. Polya's problem-solving heuristics (restatement of the problem, simplification, finding an analogy, going back, setting intermediate goals, etc.) serve as a practical algorithmic basis for the primary education teacher in lesson design. Flavell's metacognition theory illuminates the "internal mechanism" of the heuristic method: the teacher plans, monitors and evaluates his own learning process; this process is reinforced through reflective writing, "think-aloud", checklists and "question diaries".

In the motivational context, the self-determination theory (SDT) proposed by Deci and Ryan is important: intrinsic motivation is awakened when the needs for autonomy, competence, and social connectedness are satisfied. In the heuristic lesson and heuristic professional development module, the teacher has the right to choose (autonomy), experiences a sense of success (competence), and makes discoveries in collaboration with colleagues (connectedness). As a result, learning activity becomes a stable internal energy independent of "external stimuli". The self-directed learning model (planning-action-reflection cycle) emphasized by Zimmerman is naturally combined with the heuristic method: the teacher sets learning goals himself, chooses strategies, and analyzes the results according to criteria. Activity theory (Leontiev) and social constructivism interpret the socio-pedagogical nature of heuristics: cognitive activity is organized using social tools (language, symbols, diagrams, discussion norms); Lave and Wenger's concept of "communities of practice" suggests that a teacher's heuristic practice is formed in communication with colleagues in the network, in joint problem solving, in the creation of

common artifacts (case banks, rubricators, question matrices). Schön's reflexive practice (reflection on and after action) is a reinforcing component of the heuristic process, allowing the teacher to enrich his strategy in the modes of "rapid interpretation" and "delayed analysis". Such a broad theoretical foundation also defines the principles of practical design. Sweller's theory of cognitive load requires reducing "extraneous load" (extraneous load) in heuristic tasks and increasing "meaningful load" (germane load): visual structuring of the task, signaling signs, step-by-step instructions should serve the content of the heuristic search, but should not over-regulate the process and extinguish the discovery itself. Anderson and Kratvold's revised Bloom's Taxonomy allows for a hierarchical structure of heuristic tasks: moving from remembering—understanding to applying—analyzing—evaluating—creating, the teacher's learning activity is gradually expanded. Kolb's experiential learning cycle (unique experience—observation-reflection—abstract conceptualization—active experimentation) gives the heuristic module a "spiral" structure: in each cycle, a new experience tests previous conclusions.

This theoretical picture of the heuristic method allows us to interpret the learning activity of a primary school teacher in five components: (1) motivational (goal-oriented intrinsic interest, sense of autonomy), (2) cognitive (conceptual reconstruction, reasoning, use of analogies), (3) activity-competence (strategy selection, problem-solving heuristics, lesson design), (4) metacognitive-reflexive (planning one's own learning, monitoring, evaluation), (5) socio-communicative (collaboration, reasoning discussion, creation of community artifacts). Heuristic tasks and conversations activate each of these components "separately" and at the same time "interrelated": for example, if open questions can stimulate the motivational-cognitive system, reflective writing strengthens the metacognitive block; case discussions form a culture of reasoning through the socio-communicative block.

The theoretical framework also requires a shift in the assessment culture to the "assessment for learning" paradigm. The rubrics of formative assessment (e.g., quality of hypotheses, clarity of reasoning, variability of strategic lines, depth of reflective writing) measure the heuristic process itself; that is, the quality of the search is assessed, not the finished answers as a result. This, in accordance with SDT, supports intrinsic motivation and helps to see "error as a resource for growth." Such assessment, oriented towards "search for meaning," on the one hand, regulates cognitive load, and on the other hand, makes metacognitive skills visible through specific indicators.

The theoretical arguments for using the heuristic method in the context of professional development and professional development are also clear: andragogy (Knowles) emphasizes the need for adult teachers to feel the need for learning through problems, to turn experience into a resource. Therefore, the heuristic module should be based on "live cases" from real classroom situations, on the conceptual analysis of the teacher's own experience. The principle of "desirably difficult" (purposeful difficulties) creates the pleasure of exploration by maintaining a small amount of uncertainty and intellectual resistance; at the same time, scaffolding and indicative artifacts (sample schemes, question matrices) support the heuristic action and limit excessive cognitive load.

List of used literature:

1. Flavell, J. H. Metacognition and Cognitive Monitoring: A New Area of Cognitive–Developmental Inquiry // American Psychologist. — 1979. — Vol. 34. — P. 906–911.
2. Kolb, D. A. Experiential Learning: Experience as the Source of Learning and Development. — Englewood Cliffs, NJ: Prentice-Hall, 1984. — 256 p.
3. Polya, G. How to Solve It: A New Aspect of Mathematical Method. — Princeton: Princeton University Press, 1945. — 253 p.
4. Zimmerman, B. J. Becoming a Self-Regulated Learner: An Overview // Theory Into Practice. — 2002. — Vol. 41, No. 2. — P. 64–70.
5. Deci, E. L., Ryan, R. M. Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness. — New York: Guilford Press, 2017. — 756 p.
6. Lerner, I. Yes. Didakticheskie osnovy metodov obucheniya. — M.: Pedagogy, 1981. — 186 p.
7. Makhmudov, M. J. Problematic education: desire, confidence, perspective. — Tashkent: Science, 1991. — 212 p.
8. Turdiev, Kh. E. Pedagogical innovations and educational technologies. — T.: Science and technology, 2019. — 248 p.

