MODERN REINTEGRATION OF V. F. SHATALOV'S METHODOLOGY IN PEDAGOGICAL PRACTICE IN THE CONTEXT OF DIGITALIZATION OF EDUCATION

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Abstract. *The article examines the theoretical and practical aspects of the modern reintegration of Victor Fedorovich Shatalov's "Reference Signals" (Anchor Charts) methodological system into the educational process. The author substantiates the relevance of applying this pedagogical technology within the context of the digitalization of general secondary education. A comparative analysis is conducted between the traditional model of the methodology and its contemporary digital transformation. Particular attention is paid to the possibilities of increasing the learning efficiency of primary school students by integrating the system of reference signals with information and communication technologies (ICT), digital self-control tools, and educational analytics. The article proposes a model for a digital educational environment that includes a system for regular remote monitoring of material mastery, open tables of educational achievements, and algorithmized learning modules. The study demonstrates that the integration of Shatalov's methodology with digital educational platforms can significantly increase the objectivity of knowledge assessment, ensure the individualization of learning trajectories, and create conditions for developing sustainable student motivation amidst the modernization of the public education system in the Republic of Uzbekistan.*

Keywords: *pedagogical technology, reference signals, anchor charts, digitalization of education, knowledge visualization, educational analytics, self-control, didactic efficiency, Republic of Uzbekistan.*

Introduction

The modern educational paradigm is focused on the formation of functional literacy, metasubject competencies and sustainable learning motivation of students. Under these conditions, pedagogical technologies that ensure a high density of learning material assimilation while maintaining a psychologically comfortable educational environment are of particular importance. The methodical system of Viktor F. Shatalov, which was widely used in school practice in the 1970s and 1980s, demonstrated high learning efficiency, expressed in almost complete assimilation of the educational content by all students of the class [2].

The effectiveness of this system was determined by the use *of reference signals* that allow structuring the educational material and presenting it in a collapsed symbolic form, as well as the organization of multiple variable repetition of the educational content [3]. Modern research in the field of cognitive psychology and neurodidactics confirms that visualization of educational information, its semantic structuring and logical systematization significantly increases the efficiency of knowledge acquisition and contributes to the formation of long-term memory [4].

In the context of digital transformation of education, there is a need for scientific rethinking of Shatalov's methodology and its adaptation to the possibilities of the digital educational

environment. This problem is particularly relevant in the Republic of Uzbekistan, where in recent years a large-scale modernization of the public education system has been implemented on the basis of regulations aimed at developing the digital infrastructure of schools, introducing modern pedagogical technologies and improving the quality of educational results [1].

1. Theoretical foundations of V. F. Shatalov's methodology and its pedagogical effectiveness. Shatalov's methodological system is a comprehensive didactic model based on the following principles:

- systematic and activity-based nature of training
- consolidation of didactic units
- advanced introduction of educational material
- repeated repetition
- training at a high level of complexity
-cooperation pedagogy.

The central element of the methodology is **the reference signals**, which are compact visual schemes that encode educational information. The use of reference signals provides:

- formation of a holistic knowledge structure
-development of logical and associative thinking
- activation of cognitive activity of students [2].

Modern research in the field of pedagogy confirms that knowledge structuring technologies contribute to the development of regulatory and cognitive universal learning activities in younger schoolchildren [5]. The practice of applying the methodology demonstrates a number of stable educational effects:

- increasing the level of students' learning - reducing the time of learning material assimilation
-forming a stable learning motivation
- reducing the level of school anxiety [6].

These results are explained by the fact that Shatalov's technology corresponds to the cognitive characteristics of younger schoolchildren, who are characterized by the predominance of visual-figurative thinking.

2. Digital transformation of Shatalov's methodology

The classical model of implementing the methodology assumed the use of:

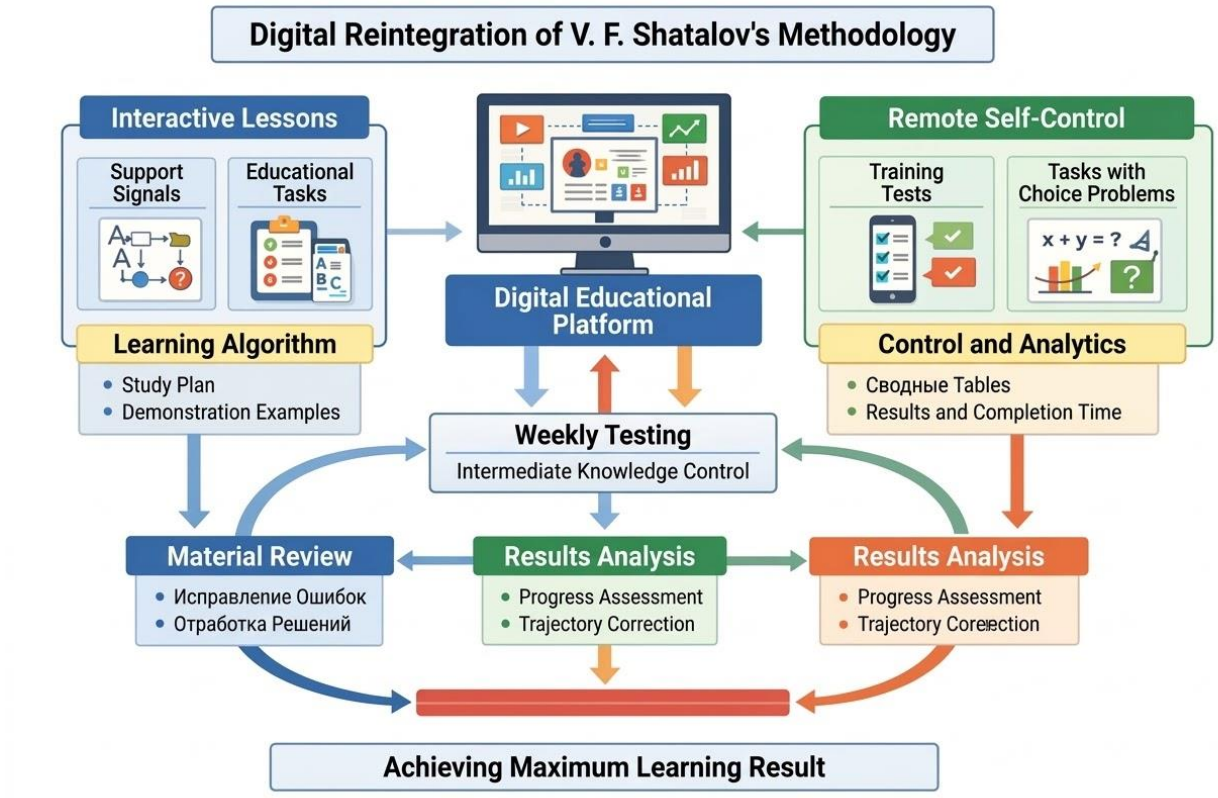
- paper reference notes
- classroom system
- front-end forms of work.

Modern digital educational technologies can significantly expand the didactic potential of this technique.

The digital educational environment provides:

- creation of interactive reference schemes
- automation of repetition processes
-instant diagnostics of the level of knowledge acquisition
- individualization of educational trajectories
- integration of multimedia learning tools [7].

Integration of Shatalov's methodology with digital technologies makes it possible to create *an adaptive educational environment*in which the process of learning is accompanied by constant analysis of educational results. *(picture1)*



Picture 1.

3. Research methodology

To test the effectiveness of digital reintegration of Shatalov's method, an experimental model was developed that includes:

Sample: 80 students of the fourth grade of Yangiyul schools (Uzbekistan).

Research design: a quasi-experiment with a control group (traditional method) and an experimental group (simplified model of a digital system).

Tools:

- digital platform with interactive reference signals
- self-monitoring module with step-by-step algorithms for solving problems
- weekly tests with variable tasks
- open tables for monitoring academic achievements.

Procedure: implementation of the platform during the academic semester; weekly monitoring of topics 'assimilation; real-time recording of tasks' completion and quality; collection of analytical data to assess progress.

Analysis methods: comparative analysis based on such criteria as:

1. speed of mastering the material
2. task completion quality
3. dynamics of learning motivation and activity
4. objective assessment of knowledge (taking into account the time of execution and the number of attempts).

4. Digital system of self-monitoring and open demonstration of results

4.1. Digital Material Learning Module. Each topic of the curriculum is accompanied by:

- step-by-step learning algorithm

- visual diagrams and visual, animated models
- demo examples of completing practical tasks
- various solutions (detailed, step-by-step, abbreviated).

4.2. Variable training tasks. The platform offers:
- tasks with multiple source data options
- exercises for working out solution algorithms
- step-by-step instructions for visualizing the solution.

4.3. Weekly knowledge monitoring system. Peculiarities:
- multiple passing of control tasks
- gradual increase in difficulty
- individual maximum achievement level for each student.
- repetition of long-passed material that is not used at the moment of the educational process

4.4. Open tables of educational achievements. Functions:
- tracking the dynamics of mastering each topic
- visualization of progress
- formation of internal motivation and responsibility.

4.5. Real-time tracking. The platform records:
- time for solving problems
- sequence of steps
- number of attempts

This allows you to avoid accidental execution and increase the objectivity of certification.

There was also an increase in the level of participation in the educational process of parents who received an effective tool assistant, when performing homework and preparing for the certification of their children. Positive feedback was received about the digital module for studying materials with a demonstration of design options and algorithms for solving problems. It is also worth noting that the tasks were selected not only according to the content of textbooks used in schools in Uzbekistan from 2023, but also other content.

5. Comparison table: traditional system vs Shatalov system (digital)

Criterion	**Traditional**	**system Shatalov system (digital)**
Evaluation approach	Summary, one	-time Constant, multiple
Motivation	Often external	Internal, through progress
Accounting for errors	Lack of alternatives	Possibility of correction
Material form	Text, oral survey	Reference schemes, visualization
Knowledge diagnostics	Summary	Weekly, for each step
Individualization	Limited	Maximum through adaptive content
Solution time	is not individually	Taken into account real individual execution time

Criterion	Traditional	system Shatalov system (digital)
Transparency of results	Low	High, open tables

6. Prospects for implementing the digital version of Shatalov's methodology

- creation of a national digital reference signal platform
- integration with educational analytics of schools in Uzbekistan.
- Integration of Shatalov's methodology with information and communication technologies opens up new opportunities for the development of the educational system.
- Key prospects include:

- creation of a national digital reference signal platform
- development of adaptive learning platforms
- implementation of educational analytics systems
- development and implementation of remote forms of self-monitoring and regular monitoring
- development of modules for algorithmic learning and visualization of knowledge

This direction is especially relevant for the education system of the Republic of Uzbekistan, where a large-scale program of digitalization of educational infrastructure is being implemented [4].

7. Conclusions

1. The methodological system of Viktor F. Shatalov has a significant didactic potential, confirmed by both historical pedagogical experience and modern scientific research.
2. The basic principles of this technology fully meet the modern requirements of competence-based and activity-based approaches.
3. The digital educational environment makes it possible to significantly expand the possibilities of using Shatalov's methodology by introducing educational analytics tools and self-monitoring systems.
4. Integration of reference signals with information and communication technologies contributes to improving the effectiveness of training and the objectivity of evaluating educational results.
5. Modernization of the education system of the Republic of Uzbekistan creates favorable conditions for the practical implementation of this pedagogical model.

Practical suggestions:

- creation of a national digital platform of reference signals
- introduction of a system of weekly remote control of knowledge
- development of digital algorithms for studying and mastering educational topics
- introduction of open tables of educational achievements
- integration of educational analytics into school information systems.

REFERENCES

1. Uzbekistan. President (2016 -; Shavkat Mirziyoyev). On measures for the development of the public education system: Decree of the President of the Republic of Uzbekistan No. UP-5712 dated April 29, 2019. - Text: electronic / / National Database of legislation of the Republic of Uzbekistan (Lex.uz).

2. Shatalov V. F. Tochka opori [Point of support]. - Donetsk: Donbass, 1987. - 158 p.
3. Shatalov V. F. The experiment continues / V. F. Shatalov. Moscow: Pedagogika Publ., 1989, 334 p. (in Russian)
4. Mayer, R. Multimedia Learning / R. Mayer. — 3rd ed. — Cambridge: Cambridge University Press, 2021. — 416 p.
5. Asmolov A. G. Sistemno-deyatelnostnyy podkhod v obrazovanii [System-activity approach in education]. - Moscow: [B. I.], 2020. - 210 p.
6. Polat E. S. Sovremennye pedagogicheskie tekhnologii: uchebnoe posobie dlya vuzov [Modern pedagogical technologies: a textbook for universities]. Moscow: Akademiya Publ., 2020, 256 p. (in Russian)
7. Selwyn, N. Education and Technology: Key Issues and Debates / N. Selwyn. — 3rd ed. — London: Bloomsbury Academic, 2022. — 280 p.
8. Redecker, C. European Framework for the Digital Competence of Educators: DigCompEdu / C. Redecker; edited by Y. Punie. — Luxembourg: Publications Office of the European Union, 2020. — 140 p.