

Pedagogical technology: A specific historical approach

Tecnología pedagógica: un enfoque histórico específico

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Abstract

In the present context of numerous reforms, modernization and upgrading, much attention is given to the content of education, while the technological bases of education, which has not been subjected to redesigning for decades, is virtually neglected. It resulted in the decline in the quality of education, which is illustrated by the data of international studies PISA, TIMSS, PIRLS, TALIS, etc. In regard to the above, this article examines the questions of organization of educational process, the core component of which are general forms of education



that depending on the specific historical conditions dominate in its organizational structure. Underestimation of these laws of development of educational process led to the constant and systemic improvement of traditional pedagogical technology, i. e. group learning that was established in schools and higher educational institutions as early as in the 16th-17th centuries. The lack of a unified understanding of the entity and categorization of pedagogical technologies in pedagogical theory and practice has resulted in the need to define the concept of “pedagogical technology”, as well as categorize pedagogical technologies based on the specific historical approach. This article also provides an analysis of the concepts and categorization of pedagogical technologies that are aligned in accordance with the so-called psychological-pedagogical approach. Based on the specific historical approach (V. K. Dyachenko), analysis of long-standing pedagogical practice and scientific studies, this article proposes a justification of the need to reform and master a new and the latest pedagogical technology of collective learning and ways of its realization. The novelty of this study consists in the fact that it offers a new approach to the definition of the concept “pedagogical technology”, categorization and characterization of realization of collective learning “vertically” and “horizontally”, presents practical results of the implementation of each of them.

Keywords: pedagogical technology, group learning, collective learning, new and the latest pedagogical technology.

Resumen

En el contexto actual de numerosas reformas, modernización y perfeccionamiento, se presta mucha atención al contenido de la educación, mientras que las bases tecnológicas de la educación, que no ha sido objeto de rediseño durante décadas, prácticamente se descuida. Resultó en la disminución de la calidad de la educación, que se ilustra con los datos de los estudios internacionales PISA, TIMSS, PIRLS, TALIS, etc. En relación con lo anterior, este artículo examina las cuestiones de organización del proceso educativo, el componente central de las cuales son formas generales de educación que en función de las condiciones históricas específicas dominan en su estructura organizativa. La subestimación de estas leyes de desarrollo del proceso educativo condujo a la mejora constante y sistémica de la tecnología pedagógica tradicional, i. mi. aprendizaje grupal que se estableció en escuelas e instituciones de educación superior ya en los siglos XVI-XVII. La falta de una comprensión unificada de la entidad y la categorización de las tecnologías pedagógicas en la teoría y la práctica pedagógicas ha resultado en la necesidad de definir el concepto de “tecnología pedagógica”, así como categorizar las tecnologías pedagógicas con base en el enfoque histórico específico. Este artículo también ofrece un análisis de los conceptos y categorización de tecnologías pedagógicas que se alinean de acuerdo con el llamado enfoque psicológico-pedagógico. Basado en el enfoque histórico específico (V. K. Dyachenko), análisis de la práctica pedagógica y los estudios científicos de larga data, este artículo propone una justificación de la necesidad de reformar y dominar una nueva y última tecnología pedagógica del aprendizaje colectivo y las formas de su realización. La novedad de este estudio consiste en que ofrece un nuevo enfoque a la definición del concepto “tecnología pedagógica”, categorización y caracterización de la realización del aprendizaje colectivo “verticalmente” y “horizontalmente”, presenta resultados prácticos de la implementación de cada de ellos.

Palabras clave: tecnología pedagógica, aprendizaje en grupo, aprendizaje colectivo, tecnología pedagógica nueva y de última generación.

Introduction

The popularity of this concept is interpreted in various ways. Some researchers pay tribute to the conjuncture, a trendy area; others regard it as a means of achieving higher results of training and education; others (to which category the authors if this article also attribute themselves) believe that the creation of pedagogical technology is a natural process in solving current and promising tasks put forward for education by the future information civilization.

In the field of education, the term “technology” was not accepted for a long time, because “it was considered unacceptable to take liberties in the interpretation of such purely creative and intimate psychological processes as training and education” (Bespalko, 1989). It was believed that the parameters of human life and living systems could not be designed and predicted at such a level of certainty as technical systems. In other words, technological nature in relation to human-human interaction is hypothetical and is just a metaphor, not a rigid parameter of activity.



At the same time, literally every teacher can object and say that s/he introduces, uses, applies new pedagogical or educational technologies, which are also vividly described, first of all, in the first and second editions of G. K. Selevko's collection of educational technologies (Selevko, 1998; Selevko, 2006). According to him: "In the theory and practice of schools today there are many options (highlighted by the authors) of the educational process. Each author and performer brings something different and individual to the pedagogical process, which is why they say that each specific technology (?) it is the author's work. We can agree with this opinion. However, many technologies have quite a lot of similarities in their goals, content, methods and tools used, and these common features can be categorized into several generalized groups" (Selevko, 1998).

Our attention to the works of G. K. Selevko is due to the fact that they were the most popular works on pedagogical technologies among the scientific and pedagogical society. At the same time, we do not detract from the significance and value of the works of such famous researchers as V. P. Bespalko, M. V. Klarin, D. V. Chernilevsky, etc.

According to G. K. Selevko, by intrinsic and instrumental significant properties (e.g., the target orientation, the nature of teacher-student interaction, education organization) 11 classes of educational technologies are distinguished:

- 1) by the application level;
- 2) by the philosophical basis;
- 3) by the leading factor in mental development;
- 4) by the scientific (?) concept of learning;
- 5) by the orientation towards personal structures;
- 6) by the nature of the content and structure;
- 7) by the type of organization and management of cognitive activity;
- 8) by the adults' attitude towards the child, the child's position in the educational process;
- 9) by the prevailing (dominant) method;
- 10) by the category of students;
- 11) by the content and area of modernization and modifications of existing traditional systems (Selevko, 1998).

In brief, such is the classification of pedagogical technologies proposed by G. K. Selevko. Such extensive and informative work on grouping educational technologies in pedagogy has been done for the first time, and we must pay tribute to its author, who, despite the complexity of the problem, has done a great deal of work

generalizing, systematizing and categorizing the existing technologies today.

However, this categorization has a number of significant shortcomings:

1. In fact, it proposes not one, but eleven classifications, produced on different grounds.

2. The grouping of technologies by levels does not stand up to criticism due to the fact that there are no methodological and local technologies, but only methods used within a particular organizational system – class-based or lecture-seminar (in general, group learning – in the terminology of V. K. Dyachenko), as dominant ones in the world educational space.

3. From the classification under consideration, it is not clear how the "traditional class-based system of Ya. A. Komensky" differs from "modern traditional education." Perhaps, by the method of presentation, "didachography" and the combination of both with technical means of education. Indeed, at the time of Komensky, technical means of teaching were not used, because they did not exist, but the very essence, i.e. the organization of the educational process, has changed little, or one can even say, practically has not changed – it is based on the primacy of the teacher's activity over the student's activity. No improvements in class-based learning, even with the help of technical training tools, information and communication technologies, do not change its essential basis.

4. Stating that "pedagogical technology is always of complex nature", for some reason he further denies the complexity of the categorized "technologies" and points out that "the educational process is based on any one priority, dominant idea, principle, concept." Only author's schools he attributes to the complex "polytechnologies."

In general, it is possible to say, as the author of this classification states, that it is only a classification of the existing practice of training and teaching, but not a predictive approach to the educational process.

In one of his works, G. K. Selevko admits that: "This classification does not fully meet the strict requirements of the unity of grounds, uniformity (order) and mutual exclusion of objects and therefore requires further refinement. It can serve as a basis for implementing a technological approach and orientation in the world of educational technologies. Some classification units are more suitable for solving practical problems of the educational process, while others are only of theoretical interest.

When identifying a specific educational technology, it should be borne in mind that classification types do not always exist in their pure form (in a monovariant), but more often they are integrated, combined, and penetrate each other” (Selevko, 2005).

Pedagogical technology from the standpoint of natural science (or simply: scientific) approach is understood as the process of self- and mutual-learning of students under the guidance of a professional teacher, the changes and transformations that occur with them at each stage of their work on mastering the content of education and those activities that are provided by the curriculum and programs (syllabus) (Kussainov, 2012).

From the standpoint of a specific historical (natural-historical) approach, it is possible to distinguish three technologies that correspond to three stages of development of the educational process:

- 1) The technology of the individual method of learning (IML), which dominated since the earliest time until the 17th century and was revived in the early 20th century;
- 2) The technology of the group learning (from the 17th century to the present: today it is being integrated with IML);
- 3) The technology of the collective teaching that is used since the 20th century (it is local in nature and is practically unknown to the general pedagogical community) and will be used in the future (Dyachenko, 2018; Kussainov et al., 2019).

In accordance with this approach, the new pedagogical technology means the organization of the educational process using the methods of cooperation “horizontally” in the conditions of group learning, and the **latest** – the organization of the educational process using the methods of cooperation “vertically” in the conditions of collective learning, or the method of continuous knowledge transfer (Dyachenko et al., 2018; Kussainov et al., 2018).

The organizational basis of the new and the latest pedagogical technology is the primacy of collective training sessions, collective forms of training over the traditional ones – individual, pair and group learning methods.

The place of pedagogical technology and its relationship with other concepts can be represented graphically (Fig.1).



Figure 1. Systemic position of pedagogical technology

The fallacy of the position of many modern researchers and practitioners is not only that they are trying to modernize the technology of individual-group learning, but also in neglecting the activities of students, in focusing on improving the activity of the teacher, although all modern concepts (personality-oriented, active, differentiated, developing, etc. training) seem to be focused on transforming the role of the student into the subject of the educational process. For pedagogical technology, it is important not only and not so much the activity of the teacher, but also the students, the formation of certain qualities in them. If this aspect is omitted or ignored, a teaching methodology is obtained instead of a teaching technology.

Therefore, many so-called technologies are just techniques aimed at improving the traditional individual-group learning. Naturally, one can endlessly make improvements without having any tangible results in the quality and effectiveness of the educational process.

Any improvements within the framework of traditional technology, the introduction of new principles or methods (strategies and techniques) in teaching do not change the overall basis of the educational process. When preserving group learning, any significant, fundamental changes in the quality and effectiveness of education and training are unrealistic.

It is necessary to switch to collective learning, in which the pedagogical process at the initial stage is carried out in accordance with new pedagogical technology, the essence of which can be expressed as follows: each new topic (theoretical and practical parts) is studied by a participant independently, but under the direct control of another participant who has already worked on this topic, i.e. can provide immediate assistance. The benefits of this technology are mutual: those who study the topic initially are trained to independently study new material, while receiving timely, urgent advice from their fellow teachers, which



contributes to a faster pace of progress in the program material.

The participant, who turns out to be a teacher-consultant in this way consolidates own knowledge on this topic, while achieving better assimilation. For them, the role of a teacher-consultant is an active form of repetition and consolidation of new material, if a participant in the same class is engaged, someone who has just studied this topic. It also has a positive significance for those who studied this topic a year or two ago, i.e. for a high school student. High school students, acting as teachers-consultants, get the opportunity to systematically repeat the material that was studied in the past or a year before.

The results of the introduction of new pedagogical technology in secondary schools in Almaty, East Kazakhstan and Pavlodar regions indicate high efficiency and productivity. For example, 10 years of experience at school no. 4 in Ust-Kamenogorsk (1997-2007) showed a 19 % reduction in the level of anxiety, frustration of the need to achieve success (an unfavorable psychological background that does not allow a child to meet their needs for success) – 14 %, fear of the situation of testing knowledge – 9 %, fear of inconsistency between expected and obtained results – 29 %.

The dynamics indicate a clear increase in educational and cognitive activity: from 21.4 % to 53.1 % of students with a high level and a decrease in the number of students with an average level of activity – from 63.6 % to 40.0 %.

If at first the ratio of students with high and low levels of communication skills was approximately the same – 28.3 % and 26.9 %, respectively, later there was an increase in students with a high level to 70.6 %, and a decrease with a low level to 12.7 %. There is a noticeable decrease in the number of students with an average level of communication skills – from 44.8 % to 16.7 % (Kussainov, 2012).

Further, the organization of the educational process is carried out on the basis of the **latest pedagogical technology** using methods of “vertically” cooperation for example, as follows.

Reference notes are prepared for each topic (textbook chapter). The number of such reference notes for the program (textbook) of one year of study can amount to 12-20. Reference notes are prepared by a teacher or they are given in a textbook.

Training of a student on the first topic can take place in different ways (individually, with the help of a teacher, in changing pairs). This also applies to the preparation of subsequent program topics. Basically, students are trained by working with each other or individually, according to the following algorithm:

1. Two-time presentation of material basing on reference notes to a trainee, to the participant who directly follows a teacher-consultant in the program material.
2. The person who receives a new topic set out by a teacher-consultant rewrites the reference notes, specifying the meaning of each sign or word.
3. Reading the text from the textbook, searching for answers to the questions of the program-questionnaire.
4. Student answers the participant-teacher's questions and the questions of the program-questionnaire, presents new material and uses reference notes. Their readiness for teaching is being checked.
5. The problems (the exercises) mentioned in the program-questionnaire are solved.
6. The solution of oral and written tasks and examples (exercises) is checked; training is conducted and the mastery of a new topic (topics) is checked.
7. Control work with or without additional tasks.
8. Solving more complex tasks (if there is more time).
9. Repeating the entire course of the given year of study (theory and practical tasks).
10. Direct preparation for the exam.
11. Exam (written or oral, or two types).
12. Preparation of the student for the exam. Filling in the gaps, helping the teacher.

Approximately the same steps are practiced without the use of reference notes. Relatively minor deviations are allowed when studying different academic subjects (Kussainov, 2012; Dyachenko, 2018; Kussainov et al., 2019; Kussainov et al., 2018).

The introduction of the latest educational technology in schools in the Krasnoyarsk territory and the Republic of Sakha (Yakutia) has shown that the development of academic disciplines is organized on an intensive, integrative basis, i.e. through the so-called “immersion.” At the initial



stage, both a variety of academic subjects and “immersion” are allowed. Everything depends on a reasonable and skillful combination of the two approaches.

For example, in the aspect of health saving in the experimental class of school no. 21. in Krasnoyarsk during the first three school years, the number of practically healthy children (groups I and II) significantly increased: first grade – 86.6 %, second grade – 90.5 %, third grade – 95.2%, sixth grade – 92.8 %, and the number of children from group III decreased accordingly. In the 6th grade, the number of children with health groups I and II decreased by

2.4 %, compared to the third grade, but nevertheless, this is 6.2 % more than the initial data.

Data from a 5-year study of students’ health indicate an improvement in their condition in experimental classes where collective learning was introduced (Vasilyeva, 2001; Abykanova et al., 2020b; Kussainov et al., 2020; Abykanova et al., 2020a).

Educational achievements of Yakut primary school students for 4 years of implementation of collective learning technology are presented in Table 1.

Table 1. Results of academic performance of students from groups with mixed age (GMA) (Govorova et al., 2020).

GM A	Academic year of establishment	Number of students	Results of control tests UOU, MO (%)			Results of reading technique			% performance	% quality
			Russian language	Mathematics	Yakut language	Within a norm	Higher than a norm	% quality of reading		
2-3	1999-2000	17	100/100	100/100	100/100	3	14	88.3	100	100
3-4	2000-2001	17	100/100	100/100	100/100	2	15	88.2	100	100
2-3	2000-2001	16	100/100	100/100	100/100	2	14	87.5	100	100
3-4	2001-2002	18	100/83.3	100/100	100/100	3	17	85.0	100	100

Thus, the conducted research shows that the scientific approach allows us to identify the essence of the concept of “pedagogical technology,” which should be built on the basis of self- and mutual learning, and where the student is the main subject of the educational process.

The natural-historical approach makes it possible to categorize pedagogical technologies according to specific historical conditions into three large groups: technologies of individual, group, and collective learning methods.

The latest educational technology – collective learning –, which has two modifications depending on the applied methods of cooperation (“horizontal” and “vertical”), far exceeds the efficiency and quality of the traditional educational process based on group learning.

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Biography

1. B.T. Abykanova, candidate of pedagogical sciences, associate professor, 20 year work experience in respective field, has over a 120 scientific papers, including 13 copyright certificates, 2 monographs, and 10 educative methodical aids. 19 articles published in journals included in the WOS base (H-index=3) and Scopus (H-index=4). Winner of the title "Best University Teacher -2015". The project acts as a leader in determining the real state and global trends of professional development of teachers, developing innovative content, forms, strategies and technologies for professional development of teachers in the context of updating secondary education, including using information and communication technologies in accordance with the values "Mangilik el" and "Rukhani zhagyru".

2. G.M. Kussainov, candidate of pedagogical sciences, associate professor, 30 year

work experience in respective field, holds an expert auditor certificate in the field of education and science, a large number publications and copyright certificates related to the professional development of teachers. The project acts as the main researcher on the methodology and theory of professional development of teachers, the development of a practical guide for developers of educational programs and the educational complex of educator training courses.

3. E.N. Vasilyeva, Candidate of pedagogical sciences, professor of the department of mathematics of the Krasnoyarsk territory institute for advanced training of educators, work experience over 50 years, has a large number of publications related to the professional development of teachers. The project acts as the main researcher in developing a theoretical model of professional development, new pedagogical and digital technologies, the educational program of continuing education courses for teachers, digital educational resources.

4. K.K. Shalgynbayeva, doctor of pedagogical sciences, professor, 40 year work experience in respective field, has a large number of publications related to professional education and the development of educators. 10 articles were published in journals included in the WOS and Scopus database (H-index=1). Acts as a leading researcher in the project on the development of an educational program for educator training courses, monitors and evaluates the professional development of educators.

5. A.K. Igibayeva, doctor of pedagogical sciences, professor, 40 year work experience in respective field, has a large number of publications related to professional education and development of educators. Acts as the lead researcher in the project on the development of innovative content, forms, strategies, new pedagogical and digital technologies for the professional development of teachers in the context of updating secondary education, including the use of digital educational resources in accordance with the values of "Mangilik el" and "Rukhani Zhagyru", monitoring and evaluation of the professional development of teachers