



## MODERN EDUCATIONAL TECHNOLOGIES: TEACHING METHOD, PEDAGOGICAL METHODOLOGY, PEDAGOGICAL PROCESS

**Sharipova Fotima Kakhramonovna**

Bukhara, Uzbekistan

**Abstract:** The article describes the importance of modern educational technologies and measures for their development, and also discusses the concepts of educational technology, teaching method, form of teaching and pedagogical methodology.

The stages of teaching methods and forms of teaching in the classroom and the matrix diagram are explained.

**Keywords:** educational technology, teaching method, form of teaching, pedagogical methodology, pedagogical process, technology system.

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### INTRODUCTION

Technology (from Greek - art, skill, skill) - a set of processing methods, manufacturing, change of state, etc. carried out during production. Pedagogical technologies are a system in which a pre-designed educational process is consistently implemented, guaranteeing the achievement of pedagogical goals. Pedagogical technology is one of the special areas of pedagogical science (applied pedagogy), designed to ensure the achievement of certain tasks, increase the efficiency of the educational process, and guarantee its high level.

In the narrow sense of the word, pedagogical technologies are a set of ways to organize the educational process or a sequence of certain actions, operations related to the specific activities of the teacher and aimed at achieving set goals (technological chain). There are several approaches to defining educational technologies:

Procedural is a systematic way of constructing the pedagogical process in a certain sequence of actions, operations and procedures that ensure the achievement of results.

**Instrumental – a set of methods, techniques of teaching and upbringing.**

**Systemic – a holistic educational process in an educational institution, a set of goals, content, means and methods of teaching and upbringing (pedagogical system).**

**Personal – a component of the teacher's pedagogical skill, the ability to design and implement the educational process as a system of pedagogical actions.**

A.A. Verbitsky highlights the subject-technological competence of a teacher, which means the degree of mastery of the content of teaching and upbringing, effective pedagogical technologies, abilities for pedagogical innovation, including the ability to conduct research in the field of effective pedagogical technologies and implement their results in practice.

All this requires a high level of pedagogical skill from the teacher. The level of pedagogical skill depends on the level of technological competence. Mastery of pedagogical technologies improves teaching skills. Even with average abilities, a teacher can become a master teacher (L.A. Baykova, L.K. Grebenkina).

Unlike a teaching method, technology is something that can be accurately described and algorithmized.

Characteristic features of pedagogical technologies:

*-conceptuality – technology is developed for a specific pedagogical plan, which is based on a certain methodological, philosophical, psychological and pedagogical position of the author;*

*-system activity - the technological chain of pedagogical actions, operations, communications is built strictly in accordance with targets that have the form of a specific expected result;*

*-didactic goal setting – the presence of didactic procedures containing criteria, indicators and tools for measuring student performance results and ensuring the guaranteed achievement of educational goals and the effectiveness of the learning process;*

*-innovation – technology provides for the interconnected activities of the teacher and the student on the basis of educational cooperation, dialogic communication, interactive approaches to learning;*

*-optimality – optimal implementation of human and technical capabilities, achievement of planned results in a short period of time;*

*-correctability – the ability to quickly process communications, consistently oriented towards clearly defined goals;*

*- reproducibility - can be reproduced by other teachers;*

*- effectiveness - the adequacy of the results of the pedagogical process to the goals set.*

Pedagogical systems can be described as holistic phenomena using a number of features (according to V.G. Afanasyev):

— *integrative qualities (those that are not possessed by any of its individual elements);*

— *constituent elements, components;*

— *structure (connections and relationships between parts and elements);*

— *functional characteristics;*

— *communicative properties (connections with the environment);*

— *historicity, continuity.*

The essential characteristics of the system are goal orientations and results.

As a basis, a system-forming framework, it is advisable to use a new concept for pedagogy - “technology” and a new - “technological” approach to the analysis and design of pedagogical processes.

## **DISCUSSION AND ANALYSIS**

Currently, the concept of pedagogical technology has firmly entered the pedagogical lexicon. However, there are great differences in its understanding and use.

• Technology is a set of techniques used in any business, skill, art (explanatory dictionary).

• Pedagogical technology - a set of psychological and pedagogical attitudes that determine a special set and arrangement of forms, methods, methods, teaching techniques, educational means; it is an organizational and methodological toolkit for the pedagogical process (B.T. Likhachev).

• Pedagogical technology is a meaningful technique for implementing the educational process (V.P. Bospalko).

• Pedagogical technology is a description of the process of achieving planned learning outcomes (I.P. Volkov).

• Technology is an art, skill, skill, a set of processing methods, changes in state (V.M. Shepel).

- Teaching technology is an integral procedural part of the didactic system (M. Choshanov).
- Pedagogical technology is a model of joint pedagogical activity thought out in every detail in the design, organization and conduct of the educational process with the unconditional provision of comfortable conditions for students and teachers (V.M. Monakhov).
- Pedagogical technology is a systematic method of creating, applying and defining the entire process of teaching and learning, taking into account technical and human resources and their interaction, with the goal of optimizing forms of education (UNESCO).
- Pedagogical technology means a systemic set and order of functioning of all personal, instrumental and methodological means used to achieve pedagogical goals (M.V. Clarin).”[Selevko G.K. Modern educational technologies: Textbook. – M.: Public Education, 1998. – P. 14-15]

### Definition of "educational technology"

“In our understanding, pedagogical technology is a meaningful generalization that absorbs the meanings of all the definitions of various authors (sources).

The concept of “educational technology” can be represented by three aspects.

**1) scientific:** pedagogical technologies - part of pedagogical science that studies and develops the goals, content and methods of teaching and designs pedagogical processes;

**2) procedural-descriptive:** description (algorithm) of the process, a set of goals, content, methods and means to achieve the planned learning outcomes;

**3) procedurally effective:** implementation of the technological (pedagogical) process, the functioning of all personal, instrumental and methodological pedagogical means.

Thus, pedagogical technology functions both as a science that studies the most rational ways of teaching, and as a system of methods, principles and regulations used in teaching, and as a real learning process.

The concept of “pedagogical technology” in educational practice is used at three hierarchically subordinate levels:

*1) General pedagogical (general didactic) level: general pedagogical (general didactic, general educational) technology characterizes the holistic educational process in a given region, educational institution, at a certain stage of education. Here, pedagogical technology is synonymous with the pedagogical system: it includes a set of goals, content, means and methods of teaching, an algorithm for the activities of subjects and objects of the process.*

*2) Particular methodological (subject) level: specific subject pedagogical technology is used in the meaning of “private methodology”, i.e. as a set of methods and means for the implementation of a certain content of training and education within the framework of one subject, class, teacher (methodology (trans. pp. 15-16) of teaching subjects, methodology of compensatory teaching, methodology of work of a teacher, educator).*

*3) Local (modular) level: local technology is the technology of individual parts of the educational process, the solution of particular didactic and educational tasks (technology of individual types of activities, concept formation, education of individual personal qualities, lesson technology, assimilation of new knowledge, technology of repetition and material control, independent work technology, etc.).*

There are also technological microstructures: techniques, links, elements, etc. Arranging into a logical technological chain, they form an integral pedagogical technology (technological process).

**Technology system** -a conventional image of the process technology, dividing it into separate functional elements and indicating the logical connections between them.

**Routing** -description of the process in the form of a step-by-step, step-by-step sequence of actions (often in graphical form) indicating the means used.

**Terminological nuances.** In the literature and practice of schools, the term pedagogical technology is often used as a synonym for the concept of pedagogical system. As noted above, the concept of a system is broader than technology and includes, unlike the latter, the subjects and objects of activity themselves.

The concept of pedagogical technology at the particular subject and local levels is almost completely overlapped by the concept of teaching methods; the difference between them lies only in the placement of accents. In technologies, the procedural, quantitative and calculation components are more represented, in methods - the target, content, qualitative and variable-indicative aspects. Technology differs from methods in its reproducibility, stability of results, and the absence of many “ifs” (if a talented teacher, if capable children, good parents...). The mixing of technologies and methods leads to the fact that sometimes methods are part of technologies, and sometimes, on the contrary, certain technologies are part of teaching methods.

There is also the use of label terms, which are not entirely scientifically correct, and have become established behind some technologies (collective method of teaching, Shatalov’s method, Paltyshev’s system, Waldorf pedagogy, etc.). Unfortunately, it is not always possible to avoid terminological inaccuracies that make understanding difficult.”[Selevko G.K. Modern educational technologies: Textbook. – M.: Public Education, 1998. – P. 15-16]

On the formation of “educational technology” as a direction of foreign pedagogy “Pedagogical technology is usually called a direction of foreign pedagogy, which aims to increase the efficiency of the educational process and ensure that students achieve planned learning outcomes (M. V. Klarin, 1989). Actually, the phrase “educational technology” is an inaccurate translation of the English an educational technology - “educational technology”. Until recently, this inaccuracy did not cause any discomfort. But recently, under the name “pedagogical technology”, works devoted to the problems of education are increasingly appearing in Uzbekistan. In this regard, there is a need for demarcation. You can accept the term “didactic technology”, as is the case, for example, in Bulgaria, or “educational technology”, which most closely corresponds to the original meaning. In this work, the second option will be used.

Attempts to introduce technology into the educational process have not stopped throughout our century. Until approximately the mid-50s, they were associated with the creation of a certain technical environment, a set of automated tools for traditional teaching. Since the mid-50s, a new technological approach to building the educational process itself has emerged. But the first approach continues to develop along the path of mastering new information technologies. Both directions are increasingly converging, changing the very paradigm of education. Today, the concept of educational technology can be considered broadly as a field of pedagogical science and as a specific educational technology. This will be the main object of our attention in the book we offer you.”[Guzeev V.V. Educational technology: from reception to philosophy / M.: September, 1996. - P. 8] [Klarin M.V. Pedagogical technology in the educational process. Analysis of foreign experience. —M.: Knowledge, 1989. -80 p. —(New in life, science, technology. Series “Pedagogy and Psychology”; No. 6)]

### **Definition of "educational technology"**

“Let’s define educational technology. So, let the letters PRO indicate some idea of what a

student should know, be able to, understand, imagine, value at the end of a given period of study (a block of lessons, a quarter, a semester (per. 8-9 p.), a year, and so on ). At the same time, we are not yet interested in the way of presenting these planned learning outcomes. Let us denote by TS the current state of the student, an idea of which we were able to formulate for ourselves. Then, obviously, there is a certain set of learning models  $M_1, M_2, \dots, M_n$ , which reduce the difference  $PRO \setminus TS$ . The teacher's task is to be able to identify the optimal model, including the teaching method, the forms in which it is implemented, pedagogical means and specific pedagogical techniques. Now let's give the necessary definition:

**Educational technology will be called a complex consisting of:**

- some representation of the planned learning outcomes,
- diagnostic tools for the current state of students,
- a set of learning models,
- criteria for choosing the optimal model for given specific conditions.

We will begin our consideration of educational technology with the learning model. It can be divided into two tiers. The upper tier - methods and forms - relates to didactics, the lower tier constitutes pedagogical technology (means and techniques) and, being supplemented by the personal characteristics of the teacher (intuition, demeanor, facial expressions, gestures, relationships, and so on), is the art of pedagogy. "When we say that he is a skilled teacher, that his art of teaching is great, we emphasize precisely this presence of intuition, based on experience, which we have not learned to convey, that is, we have not turned into an object of scientific consideration." [Alekseev N. G. Formation of a conscious solution to an educational task // Pedagogy and logic. —M.: Kastal, 1993.—P.385]. [Guzeev V.V. Educational technology: from reception to philosophy / M.: September, 1996. - P. 8-9]

**About "pedagogical technology" as an element of the lower tier of didactics and the (primary) object of modern foreign educational technology**

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Pedagogical techniques are independent of the means used. The best proof of this can be found in techniques used without the use of any means at all. Even something as small as asking a question can significantly improve the quality of your work. Research on modern foreign educational technology is often focused around such "little things."

Many recommendations from Western technologists to sophisticated Uzbekistan specialists seem naive and primitive. It should be noted, however, that, unlike our speculative and artificial "pedagogical experiments," behind all the advice offered, for example, to American teachers, there is a generalization of the experience of their best colleagues on huge samples.

Let's give a typical example of American educational technology - the "listen-conspire-discuss" technique, which was described by Diana Richards from New Jersey.

The teacher asks a question, offers to think through the answer, tell the neighbor and, after agreeing with him, propose a common opinion to the whole class for discussion. Various options proposed by pairs of students are considered. The question, of course, should be such that the

answer involves reflection, analysis, and comparison. Writing down the answer before speaking it enhances the effect.

Let's look at the epigraph to the novel "Anna Karenina" (from Scripture: "Vengeance is mine and I will repay"). Think about which of the four main characters in the novel it best characterizes. Tell this to your neighbor. Express your general opinion to the whole class.

This technique has obvious advantages: it promotes the active assimilation of knowledge and involves students with any level of training in subject work. At the same time, the external pattern of student behavior is the same, which also contributes to the humanization of learning. The limitations of this technique are also noticeable: the technique is convenient for working on individual details, fragments of knowledge, but being carried away by it can lead to the destruction of the whole picture and unsystematic content.

We will encounter examples of foreign, especially American, educational technology more than once. It is not difficult to discover that, as a rule, it consists of what we called pedagogical technique, which is understood as a form of organizing the behavior of a teacher in the circumstances of a school lesson and represents a complex of professional skills - including acting and directing, associated with the ability to manage oneself and the ability to interact in the process of solving pedagogical problems, the art of reception [Ilyev V. A. Technology of theater pedagogy in the formation and implementation of a school lesson plan: Uch. a manual for students of pedagogical institutes, teachers of lyceums, colleges, gymnasiums and secondary schools. - M.: JSC "Aspect Press", 1993. -127 p.]

Replenishing the arsenal of pedagogical techniques is very important for the development of a young teacher. It is not difficult to identify a reliable source. This is attending classes in other subjects. In this case, the task of the school administration is to organize such an exchange. It is important to note here that this exchange is more effective the further away the subjects taught by teachers are from each other." [Guzeev V.V. Educational technology: from reception to philosophy / M.: September, 1996. - P. 9-10]

"An actively developing science, which includes pedagogy, is characterized by the fact that there is no established global system of concepts that are equally understood by everyone. Terminological disputes that often accompany innovative developments consume a lot of time and effort without leading to any reasonable results. It seems that it is simpler and more useful, without entering into such discussions, to precisely define the concepts used if they differ from those accepted by the majority. This is what this application is dedicated to. The language of cybernetics, mathematics, and logic sometimes used does not go beyond the boundaries of classical, well-known works in these areas. Terms underlined in the text of the appendix are defined in the same text and can be found there.

**Conversation-** a form of lesson organization in which a limited didactic unit is transmitted in an interactive information mode to achieve local goals of education and development. Depending on the alternation of directions of information flows over time, there are several types of conversation: with parallel control, with pre-control, with post-control and others.

**Lecture-** a form of lesson organization in which an enlarged didactic unit is transmitted in an extractive information mode to achieve global educational goals and local development goals.

**Pedagogical technique**— the means and techniques used in their interaction within the framework of this teaching model.

**Planned learning outcomes**— diagnosable and operationally expressed learning goals, in particular, can be presented in the form of task systems.

**Workshop-** a form of lesson organization in which the entire class is divided into groups

(options with homogeneous and heterogeneous groups are possible), the groups receive tasks for a certain time, after which they report on the results, and then the tasks change cyclically from group to group.

**Story-** a form of lesson organization in which a limited didactic unit is transmitted in an extractive information mode to achieve local goals of education and development.

**Seminar-** a form of lesson organization in which an enlarged or limited didactic unit is transmitted in an interactive information mode to achieve local educational goals and global development goals.

**Task system**— a set of tasks for a block of lessons on the topic being studied that meets the requirements:

**1. Completeness.** Availability of tasks for all studied concepts, facts, methods of activity, including motivational ones, subsuming the concept, analogies, consequences from facts, etc.

**2. Availability of key tasks.** Grouping tasks into nodes around unifying centers - tasks that consider facts or methods of activity that are used in solving other problems and are of fundamental importance for mastering the subject.

**3. Connectivity.** The entire set of tasks is represented by a connected graph, at the nodes of which are the key tasks, above them are preparatory and auxiliary tasks, below them are consequences, generalizations, and so on.

**4. Increasing difficulty in each level.** The system consists of three subsystems corresponding to the minimum, general and advanced levels of planned learning outcomes. In each of the subsystems, the difficulty of the tasks is continuously increasing.

**5. Target orientation.** For each task, its place and purpose in the lesson block is determined.

**6. Target sufficiency.** There are enough problems for training in the classroom and at home, similar problems for consolidating solution methods, problems for individual and group assignments, problems for independent (including research!) activities, for current and final control, taking into account fallback options, and so on.

**7. Psychological comfort.** The system of tasks takes into account the presence of different temperaments, types of thinking, and types of memory. For example, there are tasks for oral exercises, for writing, for reading a drawing, joke tasks and others.

The type of lesson is determined by the leading goal, that is, the corresponding lesson module. There are six types of lessons: organizational, repetition lesson, lesson of learning new material, consolidation lesson, control lesson, correction lesson. The type of lesson does not depend on the time occupied by the leading module.

A lesson is a minimum teaching period, taking one academic hour.

Learning (education) goals are characteristics of expected or planned results that meet the requirements of society and personal development. We will distinguish between global goals and local goals. Local goals are diagnosable, global goals are non-diagnosable and express an ideal. The global goal is the limit of the sequence of local goals and, as a rule, is fundamentally unattainable.

A block of lessons is a set of lessons designed to study a relatively autonomous topic of a training course, the main educational period within the educational process.

Alignment, support, development group - temporary groups of students during the educational process, designed respectively to help achieve the level of requirements of the educational standard, consolidate the planned learning outcomes at the achieved level, and develop students to achieve the next level. The normal development group, in contrast to the accelerated

one, consists of students from two adjacent levels.

The didactic basis of the teaching model is the teaching method and the form of lesson organization in which this method is implemented, used in this teaching model.

Integral teaching technology is a technology of developing differentiated teaching that combines into a single whole the ideology of consolidation of didactic units, multi-level planning of learning outcomes, psychologization of educational processes and their comprehensive computerization.

The matrix of absolute grades is a ten-point absolute quantitative rating scale that reflects both the profile of learning in a given subject and the level of results achieved.

The matrix of diversity of the teaching system is an analogue of the matrix of morphological analysis (the theory of solving inventive problems) with inputs (teaching method, form of lesson organization). A tool for researching the professional competence of teaching staff, managing self-education and planning methodological work in an educational institution.

A teaching model is a complex consisting of a didactic framework and pedagogical techniques used in a given educational period.

Modular-block teaching systems are teaching technologies (systems) in which the minimum unit of the educational process is a cycle (module) of lessons, and several modules form a block.

A module of a lesson or educational process is a segment of educational time intended to achieve one and only one local goal. There are six different modules: organizational, repetition, learning new material, consolidation, control, correction. Depending on the nature of the goal, numerous types of modules are possible - for example, current repetition, supporting, generalizing, final, introductory. A lesson always contains several modules, among which there is a leader who meets the main goal of the lesson - he forms the type of lesson.

Educational technology is a system that includes some representation of the planned learning outcomes, tools for diagnosing the current state of students, a variety of learning models and criteria for choosing the optimal learning model for given specific conditions.

A workshop is a form of lesson organization in which some students are temporarily united into groups, taking into account their level achievements, to solve problems in a limited, predetermined time, after which the group's report either to the whole class, or to the teacher, or to student controllers. When reporting a group, priority is given to the subjective effectiveness of the group, that is, not so much the result of the work, but the process. This lesson form is designed specifically for integral learning technology.

The structure of the lesson is an expansion of the sequence of modules that make up the lesson into the degree of plurality of students. The sequential (linear, simple) structure of the lesson assumes that at each moment of the lesson, the statistical majority of students are in the same lesson module. Otherwise, the lesson has a parallel (branched, complex structure).

Minimum training is part of a block of lessons designed to develop the ability to solve problems that correspond to the minimum level of planned learning outcomes (state educational standard) to an automatic level.

The level of planned learning outcomes (minimal, general, advanced) is the basis for level differentiation of the educational process: operational representation of educational goals in the form of systems of tasks, identified by the nature of associative connections between subtasks (absence of subtasks, explicit connections, explicit and latent connections). Corresponds to the reproductive, reconstructive or variable type of educational activity and, accordingly, the first, second, third type of orientation.

Whole-block teaching systems are teaching technologies (systems) in which the minimum



unit of the educational process is a block of lessons.

The educational period is a period of educational time during which certain goals of training, education and development of students are achieved.”[Guzeev V.V. Educational technology: from reception to philosophy / M.: September, 1996. - P. 108-110].

### ***On the problem of classification of “methods” and “forms” of teaching***

“There are several classifications of teaching methods. Among teachers, traditional didactics, reflected in all textbooks, are widespread: verbal, visual, practical methods, and so on. This classification is based on the method of presenting educational information to students. If the classification is based on, for example, the degree of student independence in acquiring knowledge, we get another set of methods: reproductive, partial search, search, research.

Let us introduce some explanations of the above classification of teaching methods. To do this, let us imagine an extremely simplified model of the learning process for any period of study, where there are: – initial conditions, – intermediate results or tasks and ways to achieve them (solutions), – the final result.

Since this model refers to a certain period of training, here the final result is understood as the planned learning results for this period, and the initial conditions are the current state of the student at the beginning of the period. In a particular case, a lesson can be considered a learning period. Then the initial conditions are the knowledge, skills, ideas, values that the student already has and to which new learning results must be added.

If a student knows what to start from, what intermediate results to go through in studying a topic, and how to achieve them, then his functions in learning come down to remembering all this and reproducing it at the right time. Thus, we can talk about the reproductive or explanatory-illustrative method (EI).

If intermediate results are not communicated to the student, but everything else is open, then we have programmed learning (PG). Indeed, the student knows where to start and what to do. Having received the results for the first part of the action program, one must proceed to the implementation of the second part of the program and so on until the planned results are obtained. We are not discussing here the means of implementing programmed training (printed manuals, electromechanical devices like the cleverish automated classes, a computer, and even a person). If intermediate results are open, but the method for obtaining them is not communicated to the student, then one has to try different paths, using many heuristics. This is repeated after receiving each declared intermediate result. Before us is a standard heuristic search scheme, that is, we are talking about a heuristic learning method (E).

Further, if both the intermediate results and the ways to achieve them are not known, the student is faced with a contradiction between the existing knowledge and the necessary ones, that is, he finds himself in a problematic situation. His search becomes more complex. In this case, the teacher uses a problem-based teaching method (PT).

The methods considered were based on the fact that the student knew the initial conditions. This was achieved through homework, introductory repetition, special survey forms, and so on. However, recently, learning has become increasingly popular, in which the initial conditions are not allocated by the teacher, but are selected by the student himself, depending on his understanding of the task. From these conditions, he obtains results and compares them with the planned ones. If there are discrepancies with the goal, the student returns to the initial conditions, makes changes to them, and goes all the way again. This process repeats the modeling process, as a result of which the method is called model (M). It is possible that by hiding different elements

of the scheme from the student along with the initial conditions, we will obtain varieties of the model method, for example, model-heuristic.

Situations with an unknown final result are not typical for school; they are used in the training of scientific personnel, as well as in such specific areas of pedagogy as the theory of solving inventive problems.

“From the previous discussions it was already clear that all the considered teaching methods can be implemented in different forms. Therefore, we will now consider the methods and forms of organizing training in their interrelation. To be specific, we will limit ourselves to two elements of the educational process: learning new material and consolidation. For example, we can talk about a model seminar, a problem seminar (in particular, “brainstorming”), an explanatory and illustrative seminar with its program, speakers, co-speakers and opponents. The conversation can be explanatory and illustrative, heuristic or something else. The question arises: can all teaching methods be implemented in all forms? Students of the Moscow Pedagogical University showed that, at least in relation to mathematics, the answer to this question is positive.

Let us present the relationship between forms and methods of teaching in the form of a matrix (see Table 1). Let us arrange teaching methods horizontally, and organizational forms vertically (without claiming any completeness in enumerating the forms of learning new material and consolidating them, we will select ten of them).

Perhaps one of the indicators of a teacher's skill is how many cells of this matrix he can fill. For example, if a teacher knows how to conduct a classic seminar, then he can mark the box at the intersection of the “seminar” row and the “he” column, since a classic seminar is often conducted using an explanatory-illustrative method and very rarely a heuristic one. Having painted the cells in this way, the teacher will see what he needs to work on, and this will allow him to create an individual self-education program and carry out a targeted search for professionally relevant information.

**TABLE 1. Matrix of diversity of teaching methods and forms**

Form/Method	OI	PG	E	PB	M
<b>Story</b>	+++++		+++++		
<b>Conversation</b>	+++++		+++++		
<b>Lecture</b>	+++++				
<b>Seminar</b>	+++++				
<b>Workshop</b>					
<b>Workshop</b>					
<b>Practical work</b>	+++++				
<b>Laboratory work</b>	+++++	+++++			
<b>Excursion</b>	+++++	+++++	+++++		
<b>Independent work</b>	+++++	+++++	+++++	+++++	

Naturally, the more filled cells a given teacher has, the higher the variety of his activities in managing the educational and cognitive process. Our matrix shows a typical set of average teachers, obtained from a representative sample across Uzbekistan (more than 4,000 teachers). This could be expected: “In traditional didactics, explanatory and illustrative forms and methods of teaching mainly predominate, with little (in relation to the entire methodological toolkit) independent work of students, carried out within the framework of various teaching theories. Some expansion in the direction of enhancing independent activity and developing the creative potential

of students can be considered the ideas embedded in the theories of problem-based learning, algorithmization of learning, etc. The implementation of the ideas of the above theories led to an increase in the quality of acquired knowledge, skills and abilities; to saving time on studying educational material, to forming certain mental actions in the student. At the same time, the implementation of the ideas embedded in each of the learning theories depended to a large extent (trans. pp. 18-19) on the teaching tools used in the learning process” (I. Robert, 1991).

Until now, we have considered the simplest model of the educational process. In fact, the educational process is an inextricable unity of three components: informational (transmission, reception, accumulation, transformation, storage and application of information - the content of training), psychological (formation and development of human individuality) and cybernetic (management of educational and cognitive activities of students). For a long time, among these components, preference was given to the first. The main goal of the school was to develop students' knowledge of the fundamentals of science. However, this is not considered a priority in society today. Personal development comes to the fore. It is not without reason that we are increasingly talking about student-centered learning. But it seems that the domestic school is not yet quite ready for such a formulation of the problem. Therefore, now the first most important component is the cybernetic component of the educational process: the student learns, and the school organizes and manages this process. But if we consider the educational process as cybernetic, then it must obey the fundamental principles and theorems of this science.

From the point of view of cybernetics, what is happening in the classroom can be considered as a complex system with the regulation of variations, where the teacher with his educational technology is the control system, and the students are the controlled object. The functioning of such systems is described by six principles, which we will consider later. Now we are interested in the first of them, formulated by W. R. Ashby, the principle of limiting diversity. In the language of cybernetics, it looks like this: a complex system with regulation of variations has a consistently high output if and only if the diversity of the control system is not lower than the diversity of the controlled object. Let us limit ourselves to an intuitive understanding of what diversity is. And so it is clear that the diversity of the class is great. The principle requires that teacher “diversity” be at least equal. There are two ways to satisfy this principle: reducing class diversity or increasing teacher “diversity.” The traditional school followed the first path, and this led to the fact that the teacher worked for the “average” student, who does not exist in nature, according to single unified programs with strict administrative control over the time (trans. pp. 19-20) “passing” this or that material. True, this leveling was always accompanied by calls for an individual approach, and it cannot be denied that there were master teachers who achieved success in this. The existing school was well suited to the society in which it operated, and the quality of Uzbekistan education was always considered one of the best in the world. But, in fact, there was no individual approach, since a real individual approach involves building for each student his own trajectory of “advancement” through the material, meeting his needs, capabilities and psychological characteristics. At best, we observed that teachers used “cards for the strong” and “cards for the weak.”

The matrix of methods and forms presented here can serve as a tool for increasing the “diversity” of a teacher, especially in combination with his accumulated arsenal of pedagogical techniques. The first way - limiting class diversity - should also not be dismissed, but the way to implement it is different - group training. More on this later, but for now let's return to the matrix, which we will now call the diversity matrix of the educational system.”[Guzeev V.V. Educational technology: from reception to philosophy / M.: September, 1996. - P. 17-20]

## **CONCLUSION**

Additional vocational education is essentially relatively new and little studied. There is still no sufficiently deep scientific basis for both additional education itself and its main categories, including teaching methods and organizational forms. There is also no legal basis.

The few special publications and studies that have taken place do not provide a fairly complete picture of the functioning of this structure. Although our entire life today, updated methods and forms of management, attempts to enter the economic market, the need for automation and computerization of modern production, many of its spheres, persistently require the improvement of theoretical knowledge, practical skills and abilities of yesterday's specialists, graduates of specialized secondary and higher schools.

There is an urgent need to update special knowledge, skills and abilities and even retrain specialists in certain traditional production areas, technologies and emerging new, modernized ones.

And for this there is no need to study again for 4-5 years. Short-term training based on optimal organization, selection of methods, techniques and forms of this training is sufficient.

This can only be achieved with a serious scientific approach to the consideration of an integral layer of the general system of vocational education, which is called "additional vocational education." And, of course, taking into account the specifics\* of the student, and he is an adult, most often with a higher education. Not taking into account the specifics of his personality means dooming the learning process itself to uncertain results.

Our version of defining additional vocational training or adult education comes down to organizing a holistic education system that creates motivational guidelines for self-improvement based on innovative methodological structures and leading to constant self-education.

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