



# Educational Researcher

Issue 9 (2), December 2018

VOLUME 47

2018

***Educational Researcher, Issue 9 (2), (December). Volume 47. American Educational Research Association, 2018. - Pages 650-1274.***

**The edition materials are posted in Scopus and Web of Science.**

Source Normalized Impact per Paper (SNIP): 4.242
SCImago Journal Rank (SJR): 4.053

**2016 Impact Factor**: 3.827

**2016 Ranking**: 6/236 in Education & Educational Research

*2016 Journal Citation Reports®, Thomson Reuters



**ISSN: 0013-189X**
**eISSN: 1935-102X**

# *The Substantiation of Technological Phenomenon in the Context of Future Teacher's Scientific and Research Culture*

***Viktoriya Tusheva,***
*H. S. Skovoroda Kharkiv National Pedagogical University*
*Professor, Doctor of Pedagogical Sciences*

**Abstract:** The article substantiates the topicality of the problem of formation of future teachers' scientific-research culture, the necessity to create an appropriate pedagogical strategy under the conditions of higher education fundamentalization and universalization. The aim is to reveal the peculiarity of technological phenomenon in the context of scientific-research culture of the subjects of educational process on the basis of the activity conception and system approach. Different points of view and definitions of the concept «technology» are considered. «Technology» is viewed as a combination of methods and types of activity that organize the activity and direct it in such a way that it promotes its efficient and optimal functioning.

The technological mechanism of future teachers' scientifc-research culture is revealed from two positions: as being divided by actions and operations (activity and operation aspects) and being divided by stages (logic and organization of the research, the content of each stage), which determines the content aspect of the activity. Its peculiarity as the invariant core is grounded.

***Keywords:*** technology, activity concept, future teachers' scientific and research culture, activity organization, pedagogical research, research phases: projecting, technological and reflexive.

**Topicality of the problem.** In the context of globalization of higher education, when knowledge becomes its important resource and the attention is paid not only to the object of gnostical-cognitive process, but also to the personal markers of its subjects, future teachers' scientific potential is considered to be the highest stratum and their qualifying characteristic while inquiry-based learning is considered to be the highest strategic trend in ensuring the quality of vocational education.

These socio-cultural and pedagogical challenges correlate with the main directions of the development of national education in terms of achieving its efficiency and competitiveness, creation of an integral comprehensive system of attracting future teachers to different vectors of research, an integral scientific comprehension of educational and pedagogical reality along with finding solutions to a number of problems dealing with fundamentalization and universalization of higher education. All this requires a purposeful pedagogical strategy for the formation of scientific and research culture of future educationalists, teachers in a higher pedagogical school.

A significant contribution to the development of the theory and methodology of formation of scientific and research culture in the conditions of a higher pedagogical school was made by national (S. Honcharenko, O. Mykytiuk, V. Semychenko, L. Sushchenko and others) as well as foreign scientists (W. Humboldt, V. Kessler, Z. Kyl, V. Knokhel, M. Olten, Ya. Olberts, E. Sharte and others), works by V. Zahviazynskyi, V. Kraievskyi, H. Shchedrovytskyi are of great methodological significance.

The **purpose of the article** is to substantiate the peculiarity of the technological mechanism of future teachers' scientific-research culture on the basis of the activity concept and system approach.

**Main research material presentation**. Trying to reveal the essence of the technological phenomenon in the context of the chosen problem, it is necessary to point out such concepts as «way of activity», «technology» and «culture», study their interconnection and correlation. Thus, on the one hand, values and achievements of culture are mastered and created in the process of activity, which confirms the fact of their inseparable connection. On the other hand, culture as a personal phenomenon is manifested while doing the activity in which characteristics of technological interaction are viewed as having considerable importance in the process of activity structure reproduction. This enables to focus on singling out the immanent mechanism of the activity, certain ways of their realization and deployment, that is, technology. Such dealing with the issue creates a perspective in studying scientific and research culture within the two systems and their interaction and interconnection – activity (its technology) and culture as expression of a researcher's personal qualities (thinking processes, personal innovative ideas).

Activity concept, on the basis of which the originality of the mechanism of management and organization of research as an integrative, multi-vector, multilevel

process that influences its qualitative and quantitative characteristics, becomes a theoretical and methodological basis in the coverage of the investigated issue.

According to the scientific sources [1, 2] there are two trends in the analysis of the concept «technology». The first one presuppose defining actions and operations, basic procedures, methods and algorithms of activity; the second one fixes organization of the activity, which includes stages, logic of research.

Judging from the positions of operational and procedural approach we offer to consider the notion «technology» as in Explanatory Dictionary (D. Ushakov), which contains the following definition: «technology» is a set of techniques used in any case, trade, art. V. Bespalko offers a similar approach to defining this concept. He draws attention to its procedural side. Thus, the term «technology» is viewed as a way of implementing a particular complex process by dividing it into a system of consistent interconnected procedures and operations that are performed unambiguously and have the goal of achieving high efficiency.

V. Huzeiev [3] interprets the concrpt «technology» from a different perspective. He focuses on the organizational moment in doing the activity, determining certain principles and the order of their implementation. Thus, according to the scientist's opinion, «technology» is the rules of organizing the activity and choosing the means of its implementation; the activity in the result of which the set objective is achieved and the object is changed; it is also the element of the control mechanism and a means of translating the abstract language of science into a specific language for achieving the goals set.

There is a point of view according to which the attention in the ration «technology» – «activity» is not paid on the technology «in explicit form» but on some properties characteristic of activity phenomenon. In this sense, technology is considered as a reproductive parameter of the activity (Ya. Ponomarev); executive subsystem, containing actions as to the use of means of goal-achivement (V. Monakhov); instrumental component of activity (E. Yudin). Consequently, the given list gives us understanding of the fact that the vector of this terminological continuum is directed from the property of reproductivity, which lies «on the surface» to the fixation of presence of some universal parameter in the structure of the activity. This universal parameter optimizes its functioning.

The generalization of various scientific opinions enables to consider the concept of «technology» as a set of means and methods of activity, which organize

and direct it in such as a way that promotes its efficient and optimal functioning. Consequently, the theoretical analysis of technology as a conceptual unit makes it possible to distinguish its characteristic features, such as: the division of process into internal interconnected stages; structural roughness, orderliness of the process; coordinated and phased performance of the actions aimed at achieving the expected result; determining the main principles of behavior which ensure functioning of specific stages of the system of performance.

Understanding the technological mechanism of the scientific research and its formation on the basis of the principle of holism as the unity of coordination and integration, interaction and interdependence of such dichotomies as «reproductive – creative», «rational (logical) - irrational (emotional)» gives the idea about harmonious combination of technological and creative origins. In this aspect, technology is based on the knowledge of operation modes which ensure its optimality, efficiency, intensity. At the core of the creative component there is a productive process of creating new conceptions and ideas, building them up into a logical set of proofs and conclusions. In the real process of scientific research, it is not possible to separate the norm from creativity as it is in a moving interaction.

It is possible for a future teacher to master the technology scientific-research activity under the conditions of using mechanisms of scientific creativity at the level of theoretical substantiation of the scientific problem, the use of different combinations of research methods, and pedagogical creativity as a mean of design and development of author's educational technologies, organizational and methodological conditions for their application and implementation in pedagogical practice. Such a creative core has its manifestation in the developed concept of the research, which is subject to all the researcher's actions and reflections.

According to the logic of our considerations and being based on the above-mentioned provisions, it is expedient to highlight the technological mechanism of scientific-research culture of the future teacher from two points: as being divided by actions and operations (*activity and operation aspect*) and being divided by stages (logic and operation of the research, content of each stage), which determines the *content aspect of the activity*.

The scientific realization of scientific research culture as a personal phenomenon in the light of its coverage through the prism of the actiovity operation

aspect triggers the necessity to do psychological and pedagogical analysis of such structural units of activity as actions and operations.

National psychology has developed a number of conceptions as to studying the activity, its content and structure, that is reflected in general theoretical works by K. Abulkhanova-Slavska, B. Ananiev, A. Leontiev, V. Miasyshchev, S. Rubinstein, B. Teplov, as well as in the research works done by I. Zymnia, B. Lomov, K. Platonov, V. Shadrikov and others. As the scientists point out the dominant role in the structure of activity belongs to the actions which are viewed as a process that is subordinated to the achievement of a certain result which exists in the form of a goal. Apart from its intentional aspect (what must be achieved), an action has its operational aspect (how, by which method it can be achieved). The operational aspect is not determined by the goal itself, it is determined by object-subjective conditions of its achievement. As the means of doing an action, that is operation, is the result of action transformation, the activity is realized through the result of this action. The action must correspond to goal while the operation must correspond to conditions.

In order to substantiate the author's position, we refer to the theoretical statements by A. Leontiev and S. Rubinstein about the connection of external and internal (mental) actions. Research actions are viewed through the prism of internal processes namely processes of consciousness. Doing scientific research activity as any other kind of activity is characterized by awareness and purposefulness and involves the active use of mental processes (operations) as analysis, synthesis, comparison, abstraction, generalization, explanation, modelling, programming, etc. However, the real units of the activity are not actions in itself, but various «holistic activities», which determines the approach to scientific research activity as to the «integrity, not only a set of actions» (A. Leontiev).

Thus, the main idea of the interconnection of external and internal actions focuses on the following statements: actions are also behavioral acts, as the external trends are considered in inseparable unity with consciousness; actions include the act of consciousness in the form of setting and retaining the goal as a necessary component. This act is revealed in action. The principle of activity is stated through the concept of an action. The subject expresses the active beginning in the form of a goal; the concept action «takes» a human’s activity into the subjective and social world as the goal of an action has a social character.

Researcher's activities and operations that are subordinate to the structure of pedagogical research and determine the degree of integration and personalization of a specialist's personality in scientific and research activity are in the basis of skills, the formation of which witnesses about the degree of mastering a researcher's experience, determined by objective and subjective (internal) factors.

In order to identify *the content* of technological phenomenon of scientific-research culture of a future teacher we think it necessary to refer to the concept of «pedagogical research», which is mostly considered by scientists (V. Zahviazynskyi, V. Kraievskyi, P. Pidkasystyi, V. Polonskyi, V. Sheiko) from the epistemological point of view, that is, as a process and result of cognitive activity, aimed at obtaining new knowledge about the laws of education, its structure and mechanisms, content, principles and technology. Scientists refer the following features to the main characteristics of scientific and pedagogical research. These features are: the character of goal-setting – the goal has to be scientific and cognitive; the research has to be systematic and goal-oriented. Singling out a special object of the research – the object of the research has to lie in the sphere of educational and pedagogical activity; applying special means of scientific knowledge - modelling, abstraction, creation of hypotheses, axiomatic method, problem setting, experimentation, etc.; using unequivocal terminology.

On the basis of deductive analysis, we will put forward the definition of the concept of «scientific and pedagogical research». It is the production of new knowledge aimed at creation of models of educational systems at theoretical, methodological and praxeological levels for solving scientific problems and eliminating contradictions in order to ensure the quality and efficiency of the pedagogical education and enrichment of teachers' socio-cultural and professional-personal experience [4].

The content aspect of scientific research technology, which reflects the content, the sequence and logic of the stages of scientific research, has its coverage in scientific works by H.Herasymov, B.Kedrov, A.Maidanov and in the works of scientist and teachers O. Bermus, S. Honcharenko, V. Zahviazynskyi, I. Zymnia, I. Iliasov, M. Kniazian, M. Nikandrov, O. Novykov, P. Oliinyk, V. Symonenko, I. Usachova and others.

From the point of view of the course of the cognitive process and its functional analysis, *the stages of scientific research* are presented in the Philosophical Encyclopedic Dictionary [5]. These stages are:

- *description* – as a stage of scientific research, which consists of recording data of an experiment or observation with the help of certain systems of markings, used in a particular branch of science; the description prepares the transition from theoretical research of scientific object;

- *explanation* - as a stage of causal description of laws and phenomena, revealing the essence of the object under study; foresees its analysis in the context of revealed connections, relations and dependencies (laws). In the structure of the explanation as a cognitive procedure they distinguish such elements as the initial knowledge of the object; knowledge used as a condition and means of explanation; cognitive actions based on the use of knowledge, different ways of explanation for the object under study. In the scientific process, the explanation promotes clarification and development of knowledge which serves as a basis for explanation, a specification of conditions and prerequisites for using the acquired knowledge. Being naturally connected with prediciton, the explanation creates a joint function of scientific research. It is an explanatory-predictive function;

- *prediction* is the stage of a reasonable assumption about the future state of natural phenomena or society under study.

Consequently, we can state the fact that the description, explanation, and prediction as a phased implementation of the research reflect the direction of scientific research, the order of making each step, which allows to organize research activities in pursuit of achieving a certain goal; on the other hand, each stage, having its content, is associated with the implementation of the respective functions of scientific research.

Being based on the systematic approach which aims at studying the unity of procedural characteristics and effective parameters of the activity as a system, the establishment of general systematic properties, it seems promising to consider scientific research activities in the form of a project, the technological mechanism of which is implemented in a certain temporal sequence in phases and stages (the names of these stages are borrowed from the works on system analysis) [6]. The completion of the cycle of activities (a project, the system of scientific knowledge is being projected) is determined by the following phases:

- projecting phase (goal-setting), the result of which is the built-up model of the created system (a scientific research project) and the plan of its implementation;

- technological phase (full implementation), the result of which is the system implementation;

- reflexive phase, the result of which is presented in the form of evaluation of the implemented system.

The first phase – *a projecting phase* - is carried out according to the general scheme for all researches. The scheme includes: conception – finding contradictions – stating the problem – formulating the goal of the research – defining the object and the subject of the research – formulating the hypothesis – defining the task of the research – defininig research methods – deciding on the logical structure of the research (scientific research planning) - creating a research model.

The logic of the second, *a technological phase of the research*, can be built only in the most general form, as it is determined by the content of a particular research, which is unique in its essence. The stage of formulating the results includes testing the results and the correct documentation of the work.

The third phase - *a reflexive phase* - involves evaluating and self-assessment of the results from the side of the researcher. Singling out a reflexive phase if conditional, since the comparison, correlation, and analysis of the received results, their clarification and correction, which becomes clear while doing self-assessments, is a permanent process.

Thinking over what was written above, we can state that the technological mechanism of future teachers' scientific research culture is built as a system, due to successive actions, both *horizontally* (research phases: projecting, technological and reflexive), and *vertically* (the levels of research: strategic, tactical, operational).

**Conclusions.** On the basis of the activity concept and a system approach, the concept of «technology» is explained, the peculiarity of the technological phenomenon is grounded in the context of scientific research culture of a future teacher as an invariant core representing the research toolkit, the technology of scientific knowledge, determined by the existing scientific style of pedagogical society, scientific mentality, the formation of a specialist's professional culture. Depending on the level of formation of scientific research culture, its technological mechanism is filled with appropriate content, which directs the actions in the direction

of achieving the goals and doing the research, covering the full range of scientific cognition methods which are complicated and diversified in the process of research.

**Список литературы:**

1. Гусарова Е. Н. Современные педагогические технологии: учебно-методическое пособие для студентов и преподавателей вузов культуры и искусства / Е. Н. Гусарова. – М.: АПК и ППРО, 2005. – 176 с.
2. Монахов В. М. Введение в теорию педагогических технологий: Монография / В. М. Монахов. – Волгоград: Перемена, 2006. – 319 с.
3. Гузеев В. В. Теория и практика интегральной образовательной технологии / В. В. Гузеев. – М.: Народное образование, 2002. – 224 с.
4. Тушева В. В. Теоретико-методичні засади формування науково-дослідницької культури майбутнього вчителя в процесі професійної підготовки : Монографія / В. В. Тушева; УМО НАПН України. – Харків: Майдан, 2013. – 421 с.
5. Философский энциклопедический словарь / Под ред. Е. Губского. – М.: Инфра-М, 2009. – с. 311.
6. Новиков А. М. Методология / А. М. Новиков, Д. А. Новиков. – М.: СИНТЕГ, 2007. – 668 с.

**References:**

1. Gusarova E. N. Sovremennyie pedagogicheskie tehnologii: uchebno-metodicheskoe posobie dlya studentov i prepodavateley vuzov kulturyi i iskusstva / E. N. Gusarova [Modern pedagogical technologies: educational and methodical textbook] M.: APK i PPRO, 2005. – 176 p.
2. Monahov V. M. Vvedenie v teoriyu pedagogicheskih tehnologiy: Monografiya / V. M. Monahov [Introduction to the theory of pedagogical technologies: monografiia ] Volgograd: Peremena, 2006. – 319 p.
3. Guzeev V. V. Teoriya i praktika integralnoy obrazovatelnoy tehnologii / V. V. Guzeev. [Theory and practice of integral educational technology] M.: Narodnoe obrazovanie, 2002. – 224 p.
4. Tusheva V. V. Teoretyko-metodychni zasady formuvannya naukovo-doslidnyts'koyi kul'tury maybutn'oho vchytelya v protsesi profesiynoyi pidhotovky: Monohrafiya [Theoretical and methodical principles of forming of scientifically-

research culture of future teacher in the process of professional preparation : Monografiia] UMO NAPN Ukrayiny. – Kharkiv: Maydan, 2013. – 421 p.

5. Filosofskiy entsiklopedicheskiy slovar / Pod red. E. Gubskogo [Philosophical Encyclopedic Dictionary] M.: Infra-M, 2009. – P. 311.
6. Novikov A. M. Metodologiya / A. M. Novikov, D. A. Novikov [Methodology] M.: SINTEG, 2007. – 668 p.