

NONLINEAR DEVELOPMENT OF UNIVERSITY PEDAGOGICAL SYSTEM: PERMANENCE OF DIDACTIC TASKS

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The relevance of the study is determined by the socio-pedagogical transformations of university pedagogical system with all the multitude and variety of its elements oriented to nonlinear (alternative, multivariate, poly-functional) development. This trend determines the need for a correct and detailed analysis of the developmental nonlinearity of university pedagogical system, which projects the permanence of didactic tasks. In this regard, the primary attention in this paper is devoted to the theoretical and methodical justification of didactic tasks' permanence in the nonlinear development of the university pedagogical system. The leading method of investigation is the method of reconstruction, which allowed justifying the permanence of didactic tasks and proving their significance in the non-linear development of the pedagogical system. The paper reveals the pedagogical essence of didactic tasks' permanence; establishes approaches to the design and implementation of the nonlinear model of university pedagogical system; grounds the educational-methodical complex of design and implementation of permanent didactic tasks in the non-linear model of the pedagogical system. The productivity of the identified teaching and methodical complex is proved by means of the effectiveness criteria of permanent didactic problems realized in the nonlinear model of the pedagogical system. The materials of the paper can be useful for teachers of universities, students of the system of advanced training, methodologists, curators, tutors.

Keywords: didactic task, pedagogical system, nonlinear model, permanence, alternativeness, multi-variance, poly-functionality, method of reconstruction.

INTRODUCTION

Innovative transformations of the pedagogical system of the modern university are concentrated on the modification of its traditional "knowledge" characteristics, determined by canonicity and closeness, into the characteristics of openness, alternativeness and variability, polyphonic and local connection between its elements as a response to the present imperatives of society and the labor market

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(Andreev, 1996; Budanov, 2013; Zeyer, 2003; Kolesnikov, 2012; Mainzer, 2009; Malinetskiy, 2012; Shchelkunov, 2010; Masalimova & Barinova, 2016). The unified beginning for the established transformations is the permanent use of didactic tasks that determine the course of the educational process and its long-term goal - the formation of the personality of the future specialist with the qualities which is demanded by the mobile developing labor market. The importance of didactic tasks' use is determined by the nonlinear character of the pedagogical system: the goals of instruction oriented toward the formation of a self-developing personality; collegial, partner style of relations between teachers and students; the sovereignty of the system in choosing the trajectories of development; openness of education, based on the free self-expression of the individual in interaction: "teacher-student", "student-student", "student-teacher"; cooperative interaction of all elements of the pedagogical system in conditions of uncertainty and risks of the educational environment (Lazarev, 1994; Makhmutov, 1998; Novikov, 2006; Choshanov, 1997; Yasvin, 2000; Masalimova & Chibakov, 2016). In the course of the research it is established that the priority functions of the non-linear development of the pedagogical system are most fully realized in the integrative interaction between the educational space of a modern university and the Internet space in the process of implementing diagnostic, projecting, construction, research and operational-practical components of didactic tasks (Goncharuk, 2003; Kazantseva, 1999; Kirsanov, 2005; Masalimova & Ivanov, 2016). To justify the theoretical and practical significance of the permanence of didactic tasks as priorities for the non-linear development of the pedagogical system of the university, the paper reveals the pedagogical essence of didactic tasks' permanence; establishes the approaches to projection and implementation of a nonlinear model of the university pedagogical system; substantiates the educational and methodical complex of projecting and implementation of permanent didactic tasks in the nonlinear model of the pedagogical system. The productivity of the teaching and methodical complex is proved by means of the effectiveness criteria of permanent didactic problems realized in the nonlinear model of the pedagogical system.

REVIEW OF THE LITERATURE

The Essence of the Basic Definitions: "Non-Linear Pedagogical System", "Permanence of Didactic Tasks"

1. In the course of the research, the regularities in development of the semantic content of the concept "non-linearity of the university pedagogical system" are established in correlation with the needs of the university in its renewal, which meets the modern educational goals and rapidly developing educational space of the Internet. It is proved that the nonlinearity of the pedagogical system is the central concept in the organization of the educational process of a modern

university; it is a key element in the process of teaching students. In the course of the research it is used as a multi-variance, alternative and unpredictable transition of the pedagogical system from the educational space of the university to the Internet space.

2. Permanence of didactic tasks. In the course of the study, it is justified that the didactic task is a pedagogical situation correlated with the purpose of educational and cognitive activity and the conditions for its implementation (Bithinas, 1995; Vyugina, 2015). The permanence of didactic tasks is used as a constant and continuous progressive process of the goals' transition of professional activity's imitation, which constitute the core of the operational and practical component of the didactic task, possessing the generalization, problematic nature, personal determination of students with the assigned task and differentiating in the non-linear pedagogical system into intra-subject, interdisciplinary, inter-cyclical kinds.

Different Points of View of Specialists on the Research Problem

Attempts to use innovative approaches to the renewal of the pedagogical system of the university, undertaken in didactics of the last century in the world higher education systems, initiated the cardinal transformations in the process of introducing information technologies based on computer technology and electronic means of instruction, on network systems, hypertext and multimedia. These technologies are implemented in modern universities in accordance with the educational objectives and educational situations that arise in the pedagogical system often unpredictably and spontaneously under the influence of network technologies, thereby modifying the needs of students in obtaining higher education. In the course of the study, the general tendency to substitute the educational process of the university with the Internet space was revealed, which results in the delegation of the authority of the pedagogical system of the university to the network space of educational sites. The study found the absence of a unified approach to solving this problem among specialists. Supporters of active use of network space as an educational space (Ansoff, 1999; Burns, 2011; Il'ina, 2007; Ivanov, 2002; Kameneva, 2012; Kolesnikova, 2010; Kuznetsov, 2003; Young, 1997) are attracted by their information and electronic and technical advantages over the traditional system. Opponents of the use of the network (Bosova, 2008; Bespal'ko, 1996; Zagvyazinsky, 2001; Zizek, 1996; Krayevsky, 2001; Novikov, 2006; Khutorskoy, 2001), are alarmed by the fact that, on the one hand, personal involvement of the student in educational and cognitive activity in the network space is potentially amplified, and on the other, becomes implicit, remotely hidden. What is clearly perceived today as a positive factor in the transformation of the scientific and methodical priorities of the pedagogical system, the supporters of this direction are convinced that it may contain significant, methodologically incorrect solutions

for the educational space of the university. They include the transfer of educational functions and authorities from the teacher's personality to electronic means, the transformation of the educational space of the university into the space of virtual technologies, the displacement of the institutional essence of higher educational institutions from the information space in the reproduction of intellectual resources, Supporters of a more moderate, pedagogically weighed approach (Marchenkova, 2009; Novikov, 2006; Khutorskoy, 2001; Choshanov, 2013; D'Angelo, 2007; Mitra, 2005; Ruthven, 2002) are convinced in the effectiveness of the process of the pedagogization of the network space through the implementation of permanent didactic tasks. By cooperating both spaces at the bifurcation point of the non-linear pedagogical system - in the practical solution of didactic tasks with the resources of the pedagogical system of the university and the network space.

Thus, during the study of alternative points of view on the research problem, a pedagogical mechanism is established that coordinates the diversity of views and approaches to the nonlinear development of the pedagogical system of the university and regulates its application in the educational space of the university and the Internet. Such mechanism according to the result of the study is permanent didactic tasks.

RESULTS

Structure and Content of the Nonlinear Model of University Pedagogical System Development

In the course of the study, a flexible hierarchy of system-forming goals is justified, traditionally given by the society, the labor market, the pedagogical process:

- the first level of goals is the social order of society, its various social groups, to all educational subsystems for a certain social ideal of the person being formed as a citizen, a person, a professional, a worker;
- the second level is an educational goal for each educational curriculum, for each type of educational institution separately, in which the social order is transformed in terms and categories of didactics;
- The third level is those pedagogical goals that are implemented on a daily basis, at each lesson (Novikov, 2006).

It is proved that for a non-linear system there are inherent objectives of another order, involving primarily integration processes with other systems, the use of the Internet, an interdisciplinary nature in the sphere of various fields of knowledge. In a nonlinear system, there is a constant exchange of information with the environment, which makes it possible organically to use a wide variety of pedagogical approaches, teaching methods and technologies, multi-component and polyphonic cognitive processes, resulting in nonlinearity of both the process and

the result. It is established that in such a system the result of the educational process is always different from the intent of its participants, since the educational information space is constantly increasing and deduces the pedagogical system from a stable equilibrium, creating conditions for participants in the process to choose the strategy of individual progress toward success, to achieve the goal; stimulates the independence of choosing and making a responsible decision; provides development of an alternative and independent way; substantiates the specific options for choosing: the ability to determine the individual trajectory of education, the pace of education, the achievement of different levels of education, choose the type of educational institution, educational disciplines and teachers, teaching technologies, individual tools and techniques, creative tasks, etc. The established characteristics determine the determinants of the nonlinear model of the development of the pedagogical system:

- openness to the future;
- integration of all methods of mastering the world by man;
- development and inclusion in the learning processes of humanitarian ideas about the openness of the world, the integrity and interconnectedness of man, nature and society;
- appeal to ideological and semantic models;
- free use of various information sources, systems that play no less a role in education than direct educational process;
- the personal orientation of the learning process;
- development of a culture of communication;
- the psychological attitude of the learner to the super-task, in connection with which the pedagogical system must be in the process of constant search and change, forming new guidelines and goals;
- changing the role of the teacher: transition to joint partnership, collegial actions in new situations of an open, changing world (Budanov, 2013).

In the course of the study it was revealed that the reasoned choice of the format of the nonlinear model of the pedagogical system with the help of permanent didactic tasks is based on the definition of time, space, the context of the model, the range of its participants and other necessary parameters. Their number may vary depending on the pedagogical situation and the purposes of the simulation. For example, personal (each from its own position) or a cultural one (taking into account common attitudes), theoretical (based on available scientific approaches). “Territorial” self-determination of modeling is also necessary, which can be external, internal, and interpersonal. In addition, didactic tasks define a complex of theoretical, content, technological, scientific and methodical and criterion directions.

Theoretical directions:

- rethinking the goals and objectives of the content of training through the implementation of didactic tasks;
- implementation of innovative principles for building the content of education in the implementation of interdisciplinary didactic tasks, development criteria for selecting the content of tasks;
- the definition of a system of theoretical knowledge that provide the projecting of permanent didactic tasks;
- establishment of interdisciplinary links in the associated fields of professional training;
- identification of corporate relations of didactic tasks with the tasks of educational Internet sites.

Content directions:

- scientific substantiation of the selection of the content of tasks and the structuring of educational material;
- the allocation in the content of training of the main components: an invariant part that represents a description of new and promising technologies for modern production, technical facilities; a professional part uniting professionally directed knowledge, selected in accordance with groups of professions; specialized, including concepts and theories, corresponding to the specialization of trainees; ideological, uniting social - humanitarian, professional and ecological knowledge, providing the world outlook of didactic tasks.

Technological directions:

- the identity of technology with the goals, objectives, content of permanent tasks in the non-linear development of the pedagogical system;
- project character;
- interactivity;
- corporative nature;
- diagnostic nature;
- reflexivity (critical evaluation of a real social, professional situation).

Scientific - methodical directions:

- formation of an information base for the projecting and implementation of didactic tasks;
- construction of conceptual schemes, constructs of educational and curricular documentation, substantiation of the interrelation between the elements of the content of tasks and the nonlinear characteristics of the pedagogical system;

- choice of didactic and methodical means for solving permanent tasks;
- drawing up a technological map of didactic tasks (targeting, dosing knowledge for independent work in solving tasks, diagnostic methods, correction work);
- the reliance on the co-creation of teachers and students;
- interdisciplinary nature of students' knowledge.

Criterion directions:

- universal criteria: generality and universality;
- criteria for the effectiveness of didactic tasks:
 - readiness for self-transformation (motivational aspect);
 - knowledge of the content of didactic tasks (cognitive aspect);
 - experience in the use of didactic tasks in standard and non-standard situations (activity-based aspect);
 - the attitude to the content and the object of transformation (the value-semantic aspect);
 - emotional - volitional regulation of the development of the nonlinearity of the pedagogical system through the result of solving tasks.

Pedagogical Essence of Permanent Nature of Didactic Tasks

In the course of the study, based on the typical professional problem presented in the Classifier of professions as an action aimed at the fulfillment of a specific production goal under given conditions (Makhmutov, 1998), classification of didactic tasks with permanent properties is substantiated. The classification uses tasks most characteristic for the development of the non-linear pedagogical system related to the orientation toward individual work of students, to independent decision-making based on self-control, analysis, synthesis, comparison, abstraction, proof, and refutation.

It is established that the reconstruction of professional activity in the course of solving problems is carried out mainly through productive pedagogical method of imitating production situations, solving them, developing technological projects, individual tasks, projecting various systems.

The choice of simulation techniques is preceded by preparatory work to assess their effectiveness and to provide maximum compliance with the basic components of professional activity, identity with problems differentiated by the types of simulation of professional activities for diagnostic, project and reflexive ones. The established types of didactic tasks form the core of the operational and practical component of the professional activity of the future specialist (Kirsanov, 2000). These types of tasks accompany the whole process of learning, have the property of generalization, problem nature, and personal determination of students with the

assigned task and are differentiated in the non-linear pedagogical system into intra-subject, interdisciplinary and inter-cyclic species (see Table 1).

TABLE 1: CLASSIFICATION OF DIDACTIC TASKS BY THE OBJECTIVES OF ACTIVITY

<i>Nº</i> <i>n/π</i>	<i>Types of tasks due to the objectives of the simulation of professional activity</i>	<i>Types of tasks due to the objectives of the educational process</i>
1.	Diagnostic - this is not a task that extends the evaluation knowledge about the real state of the proposed transformation object, but rather simulates the ideal image of an object that can become a target in the forthcoming activity	1. Intra-subject tasks aimed at activating cognitive activity of students (evaluation, with missing data, with excessive data, with several solutions, with varying content, etc.).
2.	Project - assume the consideration of the task (problem) in its development and formulation of the results of the solution: subject area - problem situation – task - determination of the method of imitation - brainstorming - hypothesis proposing - research work - discussion in small groups - registration of results - project protection – forming of conclusions, recommendations.	2. Interdisciplinary tasks - a set of tasks-algorithms and tasks of a heuristic, creative nature, the basic idea of which is the principle of problem.
3.	Reflexive - oriented to assess not only the production, but also the human result of the task. The course of the problem and the system of relations that has developed between students in the process of solving it should be reflected. Reflection is the appeal of students to themselves and to each other in a new quality from the height of the acquired experience of joint activity. This is a vision of oneself from “here and now”, this is a retrospective look at the path that has been taken, and this is also a look into future occupational activity.	3. Inter-cyclical tasks - imitating a lot of occupational situations, characterized by a high level of problematic, diagnostic, project, reflective nature. The tasks reflect the main functions and types of project, creative activity of the future specialist.

Intra-subject types of tasks are tasks used in the process of studying the educational material in the content of a particular discipline, at the established stage of the curriculum. Intra-subject tasks are classified taking into account the definition of different functions of activity and the specific conditions for solving problems on the estimated, with missing data, with excessive data, with several solutions, varying content, for proof, for logical reasoning.

The core idea of this type of tasks is the development and activation of students' cognitive activity.

Interdisciplinary tasks are a set of tasks-stereotypes that have an algorithm for solving both creative tasks and heuristic ones, based on an alternative choice of the optimal variant from several available, pre-designed methods and approaches to their solution. The complex of these tasks complements each other, creates a

creative, problem-developing environment for students of different levels of training and forms their competence:

- to identify the problem. I.A. Zimnaya (2000) on this occasion notes that the highest stage of problematic nature is inherent in the learning situation in which the student himself formulates the problem (task), determines its decision, solves and self-controls the correctness of the decision, thereby solving the emerging problematic situation;
- to understand the problem (use knowledge and skills to understand information presented in the form of text, diagram, scheme, form, table, to integrate information from different sources);
- to characterize the problem (identify the variables presented in the problem and the relationships between them, build hypotheses, critically evaluate information);
- to present a problem (to develop a form for presenting information, to switch from one form of presentation to another one);
- to solve the problem (make decisions in accordance with the conditions of the problem posed, carry out analysis, plan it to achieve the goal);
- to reflect on the solution (investigate the solution obtained and, if necessary, seek additional information, evaluate the solution, etc.);
- to report the solution of the problem (choose the form of presentation of the result obtained and convince the participants of its correctness).

Inter-cyclical tasks are tasks that simulate a lot of professional situations. This type of tasks is distinguished by a high level of creativity, problematic, diagnostic, projective and reflective nature in accordance with the content of professional training of the future specialist. The complex of these tasks is ensured by the information component of theoretical and practical tasks, the depth and accuracy of their assimilation, the generalization of tasks (tasks reflect the main functions, types of project activity of the future specialist, reflection), their conditions include advanced principles and approaches to the search for non-standard solutions for forming the qualities of the future specialist

Educational-Methodical Complex of Projecting and Implementation of Permanent Didactic Tasks in the Nonlinear Model of the Pedagogical System

In the course of the study, the effectiveness of the mechanisms of cooperation between the educational space of the non-linear pedagogical system and the Internet space in the process of implementing permanent didactic tasks is justified. As a priority mechanism, an educational and methodical complex is used, based on the continuity of the structure and content of its traditional and innovative content:

- FSES HPE;
- curricula of teachers;
- thematic plans, seminar plans, tests, topics of abstracts;
- author's programs;
- Internet resources;
- textbooks of the new generation, teaching aids, recommendations;
- book of didactic tasks;
- algorithm of diagnostic goals of didactic tasks for the period of studying the subject, for conducting a separate lesson, for a cycle of classes;
- criteria tools for determining the level of success in the implementation of didactic tasks.

The efficiency of multi-component algorithm of educational - methodical complex's projecting, which is a step by step sequence of organizations of teachers' and students' activity: study of the specifics of the university educational system '! study of the major activities in which didactic tasks are applicable '! designing the structure, content and technologies of teaching tasks' implementation in the educational space the university and the Internet '! projecting and implementation of criteria for successful solutions problems in the educational space of the university and the Internet '! presentation of the results, reflection '! recommendations to students, teachers, representatives of the basic enterprises. The experimental verification of the applicability of the identified teaching and methodical complex in the process of implementation of permanent didactic tasks has been proved with the help of students' knowledge (level of knowledge, stability, systemic nature, completeness, structure, volume), assessment of the solution of problems (knowledge management, projecting of the strategy of actions, choice of alternatives, self-identification, readiness for innovation). Each indicator of the assessment of tasks was calculated from the point-rating system. The reliability of the obtained results was estimated using the average score of the Spearman $\div 2$ criterion. The success of the implementation of permanent didactic tasks in the nonlinear model of the pedagogical system is proved.

At the final stage of reconstruction of established types of didactic tasks, the average values of their formation were determined and revealed.

DISCUSSION

The results of the research confirm the relevance of the research problem, its theoretical and practical significance for social and pedagogical transformations of the pedagogical system of the university with the whole variety of its elements, oriented to nonlinear (alternative, multivariate, poly-functional) development. The permanence of didactic tasks in the prevailing conditions makes it possible to

implement the priority functions of the non-linear development of the pedagogical system in the integration interaction between the educational space of a modern university and the Internet. The research confirms the assumption that the non-linearity of the development of the pedagogical system of the university, projects permanent nature of didactic tasks, and didactic tasks transform the traditional pedagogical system into a non-linear one, cooperating the educational space of the pedagogical system and the Internet. This trend is noted in a number of studies (Marchenkova, 2009; Novikov, 2006; Khutorskoy, 2001; Choshanov, 2013; D'Angelo, 2007; Mitra, 2005; Ruthven, 2002), which are devoted to the problems of modernization of the pedagogical system of the university. In the course of the study, a pedagogical mechanism is established that coordinates the diversity of views and approaches to the nonlinearity of the pedagogical system mediated by the implementation of permanent didactic tasks and regulates their application in the pedagogical process as a scientific and methodical priority of the educational process. The theoretical and methodical foundations of didactic tasks' use as a pedagogical mechanism for the development of the nonlinearity of the pedagogical system have been proved and confirmed by the results of its experimental verification in the process of reconstruction of the educational and methodical complex.

The interrelation of didactic tasks mediated by the levels of the nonlinearity of the pedagogical system is proved (see Table 2).

TABLE 2: THE RELATIONSHIP OF DIDACTIC TASKS AND LEVELS OF NONLINEARITY OF THE PEDAGOGICAL SYSTEM.

№ n/n	Indicators of levels of non-linearity of pedagogical system	Subject name					
		Intrasubject (cognitive actions)		Permanent didactic tasks			
		EG	CG	Interdisciplinary (practically transformative algorithm of actions)	EG	CG	Intercyclical (Reflection, innovation)
I	Common						
	Degree of manifestation	8	4	5	3	4	2
II	Professional						
	Degree of manifestation	5	3	5	3,5	5	3,5

In the course of the study, the direct dependence of the success of didactic tasks' implementation on the levels of the nonlinearity of the pedagogical system is established, which in turn mediates the success of the application of tasks in the educational space of the pedagogical system and in the Internet space. This trend is justified by the algorithm for projecting and implementing didactic tasks: types of activities (organizational and managerial, production-technological, design and

technological, experimental) '! the formation of competences (know, have an idea, and be able to) → types of didactic tasks (intra-subject, interdisciplinary, inter-cyclical) → levels of development of the non-linear pedagogical system. Evaluation of the success rates of the use of the revealed algorithm is confirmed by the results of the reconstruction: 60% of the tasks forming stability, systemic nature, and completeness of structure, volume of knowledge, knowledge management, and action strategy design, choice of alternatives, self-identification, and readiness for innovation are interdisciplinary and inter-cycle tasks. Intra-subject tasks are used in 30% of training sessions to familiarize with professionally significant situations.

CONCLUSION

The research confirms the theoretical and practical significance of the problem of permanent nature of didactic tasks in the development of the nonlinearity of the pedagogical system of the university and the rationale for the scientific and methodical approach to the definition of pedagogical mechanisms for solving the problem. The productivity of the teaching and methodical complex has been proved with the help of criteria for the effectiveness of permanent didactic tasks realized in the nonlinear model of the pedagogical system. The established trends are presented in scenarios of permanent didactic tasks.

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