

**Stepashko V. O.**

## **ADAPTIVE MANAGEMENT OF STUDENTS' SCIENTIFIC RESEARCH**

Students' scientific research (SR) is one of the main components in the system of degree training, which ensures the preparation of prospective specialists in accord with the world labor market requirements. At present, the need for the enhancement of the quality of students' scientific research is obvious, and it has been brought about by a range of factors. The latter include the development of the "knowledge community", the integration of the Ukrainian system of higher education in the Bologna process, the modernization of higher education and the content of degree training, the globalization of research and innovations, the acknowledgement of the *Education Through Research* concept, the increased demand for innovation, the transfer of technology, the introduction of inquiry-based learning, the technologization of research outcomes, and the importance of organizing degree training in correspondence with the international standards. The effectiveness of the scientific research depends on the quality of its management by the educators and students. Therefore, the students' scientific research management in the context of a higher educational institution is critical for pedagogic and school practice.

The methodological grounds of this research take into consideration the regularities of adaptive management suggested by H. Yelnykova, the theory of modeling the managerial activity by V. Pikelna, the principles and regularities of educational systems management (Yu. Konarzhenskyi, V. Korotiaiev, V. Maslov, V. Pikelna, Ye. Khrykov), and the theory of education management (V. Sander).

According to the adaptation theory, the process of adaptation is a kind of purposeful influence, the change of the parameters of the structured system for the achievement of its optimum functioning; it can also be defined as the process of

adjustment of the system to the changes in the conditions and requirements of the society. On the basis of H. Yelnikova's research findings, T. Borova suggests the following principles of adaptive management in education: the priority of the development of an individual, management and self-management; resonance, adaptability; motivation; the growth of competencies; directed self-organization, cooperation, monitoring, qualimetry, and prognostics; further development in regard with the outcomes of the analysis; and openness [1, p. 31]. She also defines the methodological grounds of the adaptive management in education, including the classical management theory; systemic, situational, and anthropocentric approaches; the theory of adaptation, global strategy, management by the objectives; the technology of collective decision-making and joint responsibility for its realization; the theory of instability; synergetic approach; the components of adaptive management, such as content, structure, and technique. T. Borova describes adaptive management as characterized by free cooperation, the importance of individual's (subject's) development; the regulation by means of self-organization; activization of natural and creative abilities of an individual. The implementation of the adaptive management depends on the mutual influence affecting the adaptation of the subjects of activity to each other in order to set the common goal and select the actions to achieve it. The content of adaptive management encompasses the setting of the goal; criteria modeling, outcomes monitoring, cooperative actions, directed self-organization, and prognostic regulation; the structure of adaptive management is lineal and functional; the path of its realization should be based on the program and objectives (project management, adaptive module management, subordinate and intermediate partnership, cross-level coordination); the technique underlying adaptive management includes educational monitoring, monitoring accompaniment, monitoring on the basis of qualimetric models of activity of all participants of the educational process [1, p. 31 – 35].

Working at the concept of SR management, we took into consideration the principles of the directed self-organization in education management. This theory emphasizes *the priority of individual's development and activity; the orientation of*

*the development and activity of an individual so that it satisfies his/her demands, as well as the requirements of the society and the state; suggests that the processes of management and self-management should be coordinated, and self-organization must be directed; stresses the importance of creating the conditions for natural self-organization and the conditions for additional orientation; promotes dialogic adaptation of the subjects of managements [3].*

*The theoretical foundation* for the concept of SR management encompasses a range of works in philosophy (V. Andrushchenko, V. Lutai, A. Navrotskyi); researches into the role of scientific activity for individual's growth (S. Honcharenko, M. Dobruskin, M. Yevtukh, D. Zerbino, K. Lange, B. Malytskyi, N. Nychkalo, V. Onopriienko, O. Sukhomlynska); the principles of education and science management (H. Dmytrenko, H. Yelnykova, O. Kasianova, N. Klokar, Yu. Konarzhenskyi, V. Luhovyi, V. Maslov); the fundamentals of the theory of social and educational systems management (V. Afanasiev, V. Bondar, L. Danylenko, L. Kalinina, N. Ostroverkhova, V. Pikelna, Ye. Khrykov, Ye. Shamova); the principles of professional competencies formation (V. Lozova, A. Shcherbakova); the outcomes and recommendations on the introduction of organizational models into the practice of administrator's managerial activity (H. Yelnikova, V. Malykhina, V. Pikelna); the models and methods of decision approval in automated management systems (B. Bocharov, F. Butynets, A. Cherednychenko); the methodological guidelines for the organization of students' scientific research (A. Sigalov, V. Tymofieiev, T. Shamova). Our research is also based on the principles of adaptive management by H. Yelnikova, who lists the following as the design features of her theory: its dialogic character, cyclic recurrence of the processes, collection and analysis of information; the transformation of external factors into internal motifs; the affirmation of decisions in accord with the model, and the realization of this model via the directed self-influence and cooperative actions; the evaluation of the efficacy of the functioning of the management system, the organization of cooperation using feedback; predicting further research, including mutual adaptation and cooperation of the supervisory and subordinate subsystems and their reflexive development; the

enhancement of the subjective relations in the process of purposeful influences of the supervisory subsystem; the dependence of the effectiveness of adaptive management on the use of the latest research and scientific advancements; the activity of the informational “pulsar” with the direct feedback which provides for mutual correction of the activity. The adaptive management is defined by H. Yelnikova as an ability of the administration to unite different styles in management depending on the situation. The development of the adaptive capabilities of the administration occurs due to restructuring the creative groups, reconsideration of the tasks and modification of the responsibilities of the employers and employees [3, p. 181].

The analysis of the resources in psychology and pedagogy reveals that the management of the scientific research of the students in economic higher educational institutions has not been the subject of a detailed study yet. The concept of students’ scientific research management based on the use of qualimetric approach has not been worked out as well.

*The goal of the article* is the description of the concept of the adaptive management of scientific research of the students in economic higher educational institutions.

Taking into consideration the idea of the organizational culture of the managerial activity put forward by the “quantitative” school of adaptive management, we have worked out our concept of the students’ scientific research management.

***The fundamental principles of the students’ scientific research management include:***

1. The effective management of the SR is ensured by the democratization of the activity of the subdivisions of a higher educational institution, the formation of the groups of independent experts, and organization of monitoring of quality indices of the efficacy of students’ scientific and research works.

2. A necessary condition for efficient SR management is understanding the priority of students’ creative abilities and research skills development; providing for the complex nature of planning in the system of scientific research, the differentiation of scientific and research tasks depending on the students’ readiness to deal with

them, individualization of counseling, the introduction of the system of monitoring of quality indices of the students' scientific and research work effectiveness.

3. The SR will be efficient provided the innovative techniques are introduced into the system of personality-oriented learning, the methods of module and research-based learning, creative modeling, stimulation of students, and the methods providing for the rich educational environment.

4. One of the organizational conditions for the successful functioning of the system of management of the SR is working out the model of this system and determining the content of the managerial activity of the subjects. The principal constructs of the concept suggested are *achieving the goals of SR management through level management, dialogic coordination of the supervisory and subordinate subsystems' goals, as well as the external requirement with the internal needs of the students; the correlation of the external and internal management; coordinated self-organization of the SR; the introduction of project and purpose, as well as system and module forms of SR management; and competitiveness and innovation technology.*

At self-management (self-organization, self-regulation) level, the external conditions are transformed into the motifs for the activity, which means that the subjects of management coordinate the external requirements with the motivation of the students (their interests and values). At this level the subjects of management deal with the following tasks: directing the students' towards self-organization and personal growth in the course of their scientific research with the help of dialogic adaptation, mutual coordination of one's own motifs with the external requirements; coordination of the subject-subject cooperation and providing for the feedback, directing the students' to tackling topical scientific problems in the process of counseling; control and analysis of the results and orientation at self-management at the development of creative abilities.

The adaptation of the students to the educational process in an economic higher educational institution is related to creating the necessary organizational and pedagogical conditions and the adaptive external environment. Scientific research is an independent creative activity of students that requires directed self-organization

and building up the conditions for the additional orientation at the solution of the problem-oriented tasks.

The management of SR is conducted in regard with the general and purposeful functions (the latter are the functions of each of the management subsystems which are determined by the goals of management subjects' functioning). The development of the system is guaranteed by the regulation of the purposeful functions by the ascending (bottom-up) flows of information [3]. The descending flow of information is generated by orders, normative documents (statues, rules, instructions), requirements, both external (the requirements of the society for the professional) and internal (the requirements for knowledge, skills and abilities of students, guidelines for writing various kinds of research works). The bottom-up flow is constituted by the reporting (diagnostic and pretension) information [3]. The diagnostic information is acquired in the managerial cycle of a particular level as a result of polling and evaluation of the creative potential of the students with the help of diagnostic methods.

The pretension information is acquired in the course of analysis of the polls and surveys in which the students have expressed certain complaints about the low level of SR organization, informational, scientific and methodological provision of the SR, the current organizational and pedagogical conditions. Processing the information the subjects of SR management regulate the purposeful functions by means of selecting the information for descending and ascending flows of a certain level; input the processed information to the horizontal cyclic flows for further working out of the dialogic information in accord with the norms. The information acquired forms the basis for the development of the requirements for the SR (the adaptation of the requirements to its specific features), which should be included in the regulations of the university level (statute on SR) [3].

This information is also used for affirming the managerial decisions at the level of a substructure, e.g. department. The implementation of these decisions should be accompanied by the monitoring of quality indices of the students' creative potential with the help of the method of experts evaluation of the effectiveness of the SR, in

the course of which new information appears. It is analyzed and transmitted to a higher subordinate level (deans, the vice-president responsible for scientific research). The reporting information, being processed and transformed, is transmitted to the administrative department via ascending flows for its further approval and codification. After the vice-rector and deans' approval, the determining information in the form of a managerial decision via descending flows achieves the technological level of the university instructors.

In the course of information selection, processing, analysis and transmission in the universal managerial cycle the correction of the purposeful functions of the administrative subdivisions occurs, their subordinate correlation, regulation and development. The counter information flow is adapted by every subsystem of management in regard with its functions and is interpreted depending on the goals and tasks of every horizontal layer [3].

The supervisory subsystem cooperates with the subordinate through feedback, exchanging the ascending and descending flows of information. We define scientific research as the subject of management, while students are the subjects of this activity. The managerial actions are aimed at the subjects (the development of knowledge, abilities, skills, creativity in the course of the SR), while the managerial influences are directed towards stabilization, ordering of feedback (of the supervisory and subordinate subsystems). The administrator and his deputies exert influence upon the academia and the students with the help of organizational and regulatory methods.

The criterion "the effectiveness of SR management" encompasses the following indices: the levels of knowledge and abilities, the formation of independent creative activity skills, professional competence, and personality strengths (initiative, independence, and creativity). Self-management is aimed at self-growth; the SR management targets at the development of students' creative abilities and competence formation by means of providing for organizational, pedagogical, psychological conditions, and self-organization to ensure the students' personal growth. The correlation of management and self-management guarantees the development of students. Therefore, self-management provides for the student's growth on condition

it is related to external management. The outcomes of self-development are various qualitative changes, including the enhancement of quality indices of activity effectiveness; the improvement of levels of preparedness for dealing with scientific and research tasks; the development of creative abilities, formation of competence and research skills and abilities. There is a direct correlation between the intensity of information exchange in the communicative interaction of the two subsystems and the competence of the students.

As a result of information transmission, the hierarchy of cross-level adaptive management emerges. In the cooperative activity of the management subjects, university teachers and the students the functions of the substructures of SR management become connected and are, therefore, realized on the dialogic basis. The multidirectional flows of information, the goals of supervisory and subordinate subsystems have to be coordinated in the process of poly-logic communication. The department fulfills the function of an intermediary “adaptation module” which processes all kinds of information.

The main objective of SR management is aiming the actions towards the development of a subordinate subsystem (in this case, “the students”) with the help of directed self-organization of the students. If the SR is oriented at the natural development of the students, it will be even more effective and rational. The goals of the student may be different from the goals of the state. But to achieve them, the student has to coordinate them with the requirements and the goals of the state. The state puts forward its requirements for the student and creates the conditions for his/her natural development. The convergence of the students’ goals with the goals of the state and the society provides for the concord of the external and internal goals, which should be dialogically adaptive. The directed self-organization encourages personal growth in the context of the requirements the student is aware of and in the process of adaptation to the requirements of a higher educational institution [3]. The correlation between management and self-management, the requirements of a higher educational institution, and the organization and pedagogical conditions promote the creative development of the student.



The efforts of all the subjects of the managerial process have to be directed to the development of the system and the correlation of the purposeful functions. This should lead to the approval of the decisions in the context of job responsibilities with the help of correcting the curricular and syllabi. Therefore, the mission of a higher educational institution lies in achieving the integration of the needs of an individual and of the external environment, as well as the creation of the conditions for the satisfaction of the students' personal needs. The preparedness of the students to the SR guarantees for the satisfaction of their personal needs.

In conclusion, it should be pointed out that the subjects of management have to realize *the adaptability principle*, which is the basic principle for the strategic management. To provide for the emergence (correlation) (Mayo effect), the administrator of a higher educational institution and his deputies are to demonstrate adaptive mobility, be able to carry out pre-active management, since the management situations tend to change overtime (the functions and responsibilities maybe reconsidered). The effective management of the students' scientific research is possible if the supervisory subsystem receive the ascending information about the results and prognosis of further development of the objects of management. The optimization of the system of the SR is achieved in the process of cooperation of the subsystems, specialization, mutual strengthening and synchronicity (the synergy effect).

Further research in this field may be devoted to the development of standards, design of innovative techniques in students' scientific research management, modeling the content of SR management in the context of European integration and international cooperation of higher educational institutions in science, the analysis of the foreign expertise in social and pedagogical systems management.

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### **Степашко В. О. Адаптивне управління науково-дослідною діяльністю студентів**

Розроблено концепцію управління науково-дослідною діяльністю студентів. Основними положеннями концепції є цільове управління, спрямоване на результат, наскрізно-рівневе управління, сполучення зовнішнього управління та самоуправління, забезпечення саморозвитку студентів. Поєднання управління й самоуправління забезпечує саморозвиток студента. Самоуправління спрямоване на саморозвиток. Управління науково-

дослідною діяльністю студентів спрямоване на розвиток творчих здібностей студентів, формування компетентності у процесі створення організаційних, педагогічних умов, самоорганізацію для забезпечення саморозвитку. Результатом саморозвитку є якісні зміни (підвищення якісних показників результативності робіт, рівнів готовності вирішувати науково-дослідні завдання, розвитку творчих здібностей, компетентності, сформованості дослідницьких умінь і навичок). Управлінські дії необхідно спрямувати на контроль та аналіз результатів, а науково-дослідну діяльність – на природний розвиток студентів.

*Ключові слова:* цільове управління, самоуправління, цільові функції, наскрізно-рівневе управління, преактивне управління.

### **Степашко В. А. Адаптивное управление научно-исследовательской деятельностью студентов**

Разработана концепция управления научно-исследовательской деятельностью студентов. Основными положениями концепции являются целевое управление, направленное на результат, сквозное уровневое управление, соединение внешнего управления и самоуправления, обеспечение саморазвития студентов. Соединение управления и самоуправления обеспечивает саморазвитие студента. Самоуправление направлено на саморазвитие. Управление научно-исследовательской деятельностью студентов способствует развитию творческих способностей студентов, формированию компетентности через создание организационных, педагогических, психологических условий, самоорганизации для обеспечения саморазвития. Результатом саморазвития являются качественные изменения (повышение уровня компетентности, сформированность исследовательских умений и навыков). Управленческие действия необходимо направить на контроль и анализ результатов, а научно-исследовательскую деятельность – на естественное развитие студентов.

*Ключевые слова:* целевое управление, самоуправление, целевые функции, преактивное управление, сквозное уровневое управление.

### **Stepashko V. O. Adaptive Management of Student Scientific Research**

The article deals with the development of the theory of the student scientific research management. The highlights of the theory are the target management based on results; cross-level management; combining external management and self-management; and providing for student self-development. Combination of management and self-management ensures student self-development. Self-management is aimed at self-development. The management of student scientific research is aimed at the development of their creative abilities, formation of their competence by means of creating organizational, educational, and psychological conditions, as well as at the self-organization to encourage self-development. The process of self-development results in a range of qualitative changes, including the increased competency level, the formation of research skills and abilities, etc.

The author comes to the conclusion that the key factor in effective student research management is the implementation of the adaptive principle, which allows the administration of the higher educational institution to achieve the emergence effect and equips the participants of the managerial activity with the adaptive mobility and helps them to realize the preactive management. The efforts of the management process participants, therefore, have to be aimed at the control and analysis of the outcomes, while scientific research should promote the natural development of every student.

*Key words:* target management, self-management, target functions, preactive management, cross-level management.

*The article was received by the Editorial Office on 08.01.2014*

*The article was put into print on 28.02.2014*

*Peer review: Savchenko S. V., Doctor of Pedagogical Sciences, Professor*