

oriyentovani systemy navchannya. – Scientific journal of the MP Drahomanov NPU. Computer-Oriented Learning Systems. Kyiv: NPU im. M. P. Drahomanova, 4, 50-56 [in Ukrainian].

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DIFFERENTIATED APPROACH TO EVALUATION OF STUDENTS' RESEARCH ABILITIES

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Abstract. *The paper presents the problem of future specialists' inadequate perception of their attitude toward research work, caused by lack of transition from the acquired knowledge and skills to the formation and evaluation of their capacity for conducting research work under the curriculum program. The emphasis is prioritized over problematic aspects both in the training of future specialists and research selection. Based on the study of various behavioral characteristics of students, their acquisition of knowledge and skills a differentiated approach to evaluation of future specialists' cognitive abilities was implied, which arranged an opportunity to provide conditions for the development of a technological model for selecting students for a research.*

Keywords: *research activity, creativity, students, evaluation, development, technology.*

Introduction. The analysis of scientific and specialist literature revealed a lack of works concerning the development of students' abilities for research targeted at professional training, and also too weak combination of the educational process and research work. It has been found among the reasons the lack of transition from knowledge acquisition, the ability to form capacity to carry out research work within an academic subject area. Crudity of this problem alongside with the increased requirements of modern society to

research proficiency leads to decrease of the role of educational establishments [3].

Equally important is the development of future biologists' analytical thinking, the ability to find differences in the comparison of the same characteristics in the process of observing the research subject. Based on the results of the study of leading specialists' publications, it must be admitted that evaluation of skills and research training are carried out at the tenuous level, that is, at the familiarization level with insufficient methodological equipment.

Pedagogical observation of the process of future biologists' professional training, analysis of their productive activity represented a lack of cognitive and research process while studying educational subjects, gaining knowledge and developing skills of research conducting and inadequate focus on the development of abilities and motivation for scientific activity.

An analysis of current researches and publications on the research subject. It was covered the problems which are still insufficiently solved in the field of specialists training for research activity in biology, require new approaches to the development of modern methods, the development of students' professional abilities and motivation for this type of activity [2].

80% of junior students' and 20% of senior students' of biological faculty the need for reflexive analysis of the operational and procedural nature of research isn't formed: they generally cannot identify biological problems or refer to their absence in educational activities and only 22% of future specialists demonstrate superficial reflexive abilities, uniformity of individual strategies in solving technological and pedagogical problems, as well as an inadequate determination to change and self-development. Most junior students' ability to prediction and reflexive analysis of the subjective relation to other subjects of the educational process is not sufficiently developed. Formulations of the observing technique and general principles of forming the ability to conduct observations belonging to the scientific method have been paid attention of M.Ya. Basov. Most authors define observation as a deliberate perception of a certain phenomenon, while which a researcher receives a concrete factual material [7].

In the course of research work, it is important not only to teach students the accuracy and increase their activity as observers, but also to teach them the impartiality, to teach how to use knowledge alongside with acquiring experience in the right choice of technical means. In parallel, evaluate the ability to commit such actions.

In this perspective, it is interesting to select students for research activity according to specially designed tests [1].

A need arises to evaluate future specialists for their ability to achieve the final result, their knowledge of the use of various techniques, methods and techniques for research organization and management, scientific processing of

data, as well as the ability to identify and use methods, techniques, key indicators obtained during the study data, to distinguish knowledge, skills with the aim to develop and improve curricular programs, as well as what may quicken an interest of scientific community [5].

The aim of the paper is to reveal a mechanism of evaluating students' abilities in the process of acquisition of learning material (biology), their motivational interest in research activity.

The tasks of the paper:

1) to define the problem aspects of future biologists' training in the course of observation of the subject; 2) to analyze the content of scientific, methodological developments and publications in the field of scientific and research activity; 3) to develop the technology of evaluating students' abilities to research work.

Scientific novelty of the research is creation of conditions for a consistent transition from acquired knowledge and skills of future specialists to the development of their research abilities in their profession with the prospective selection of potentially motivated students and their involvement into specialized research laboratories and centers.

Research methods: analysis and generalization of scientific, methodological, psychological and pedagogical literature for the study of the state of the problem's development and the use of empirical methods and methods of statistical data handling.

Discussion. The scientists' task is to create pedagogical conditions, which, alongside with the principles of effective student activity in the educational process will develop research activity. One of the pedagogical prerequisites is the attitude of students towards research activity. Such an attitude manifests itself when they possess value orientations [6].

Research activity is determined by creative approaches. In modern science many researchers consider creativity as an integrative, system-forming component of a culture. Creative personality is characterized by such features as readiness for risk, independence and criticality of judgments, impulsiveness, cognitive curiosity, distinctness, bold imaginations and thoughts, initiative. These features are key qualities of creative research activity.

Solving problems by future specialists involves the implementation of individual and collective opportunities, and the process of solving subjective-research tasks is a technology of pedagogical activity, which characterizes the way of existence and functioning of the student's professional-research culture with a conscious decision to develop his/her own abilities [2].

It is known that there is not enough pedagogical conditions for conducting research activity under educational process. The situation requires solving the identified problems, specifically: to satisfy the need of modern educational establishments in highly qualified specialists, to provide the

development of students' professional skills in the course of educational process, to develop pedagogical tools for the implementation of this process [4].

Techniques and methods of normative research activity are integrated into a large quantity of non-standard, unforeseen situations, the resolution of which requires constant warning, making changes, corrections and regulation, which prompts future specialists to manifest an innovative style of analytical thinking [3].

Acquisition of research activity is carried out only by those and through those who are capable of creative perception of the values and technologies of pedagogical activity. Values and technologies are filled with personal content only in the process of creative search and practical implementation.

A special point is the developed need to create, which is embodied in specific abilities and their exposure. One of these abilities is an integrative and highly differentiated ability to think logically and analytically. Developed logical analytical thinking, which provides a deep semantic understanding of research information, transforms knowledge and methods into creative and professional experience.

The conducted analysis of pedagogical and research activity allowed to systematize the main directions and tasks of the educational and research process within the united field of formation of knowledge, abilities, development of abilities and to present the program directions of students' acquisition of learning material.

Proceeding from the peculiarities of the research activity of future specialists, logical conditionality and sequence of actions and operations for its implementation, it can be distinguished the following binary groups of pedagogical and research tasks for the development of capacity to research activities: - analytical and reflexive - problems of analysis and reflection of a holistic research process and its elements using knowledge and skills, including value orientations, subject-subject relations, emerging complications, etc.; - constructive and forecasting - the tasks to design a holistic research process, selection of tools and methods in accordance with the general goal in achieving the result, the development and adoption of a pedagogical decision, forecasting the results and consequences of technological and pedagogical decisions that are taken; - Organizational activity - tasks of realization of optimal variants of research process in combination with a variety of types of pedagogical activity; - Evaluation and information tasks - pedagogical, professional, subject, observation, collection, processing and storage of information on the state and prospects of the pedagogical system development, its objective evaluation (Fig. 1).

Observation includes such components: observer (subject), object of observation and means of observation. The components of the development of the ability to conduct observations are psychological factors that characterize

the level of activity and the state of the observer, as well as the factor of its impartiality, programmed to achieve a certain result. It is impossible to separate from these factors completely. It's singled out fixing (coverage of parts, sides, parts of an object) and fluctuating (full coverage of an object) observation. In addition, we distinguish the direct (in this case, the student deals directly with the properties of the object under study) and indirect (not the object of observation is perceived itself, but the consequences that it causes), proximate (carried out by sense of a student without the use of auxiliary means) and mediated (by means of devices) observation [8].

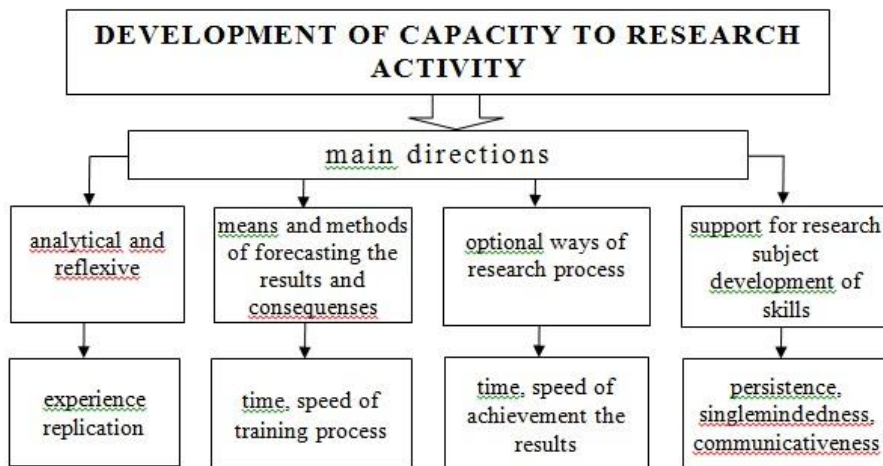


Fig.1. Program directions of theoretical and practical acquisition of material by students

The theoretical part of the program is designed to gain knowledge about the research activity purposefulness; the ability to distinguish random and typical, the choice of environment, place, time, conditions; ability to operate concepts and terms; development of analytical thinking; knowledge and ability to record results, conclusions, generalizations; the ability to explain, characterize, formulate novelty.

The following issues were solved: how to determine the task and purpose of an observation, object, subject and situation; how to choose the way of observation (the most influential and effective); how to choose the way of registration; how to get information, process it and explain the result.

One of the most important conditions is the formation of the ability to select such methods that contribute to the development of their researcher's observation, namely, the ability to substitute significant, characteristic, including obscure properties of objects and phenomena. In the absence of the

development of such qualities, the effective implementation of research activity becomes impossible (Fig. 2).

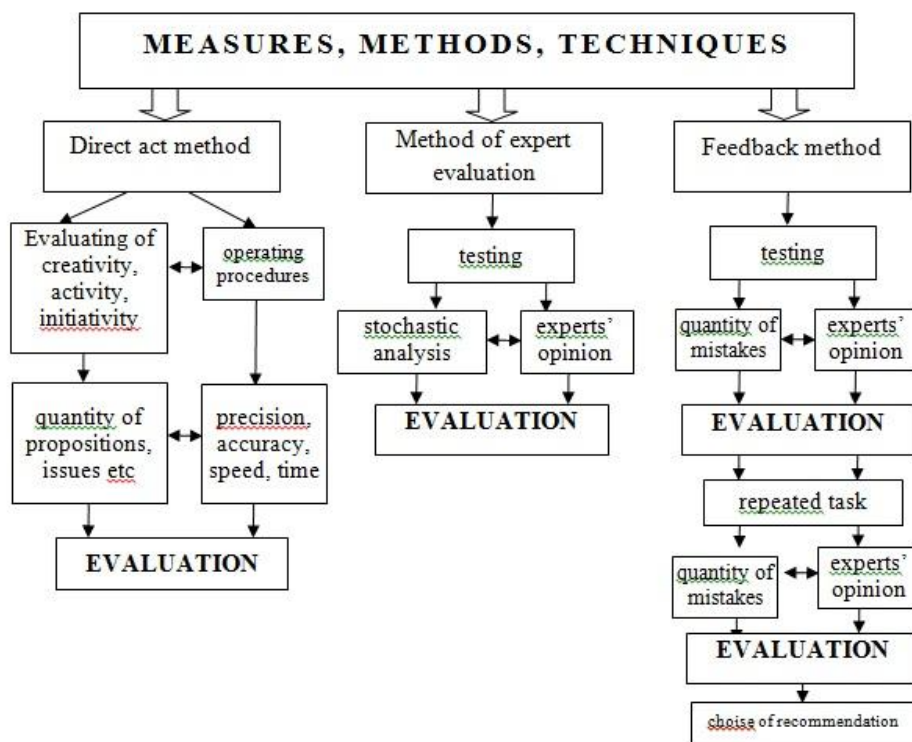


Fig.2. Technology of evaluating of students' abilities to research activity

The criteria for evaluating the external characteristics were: initiative, creativity, operating procedures, precision, rationality, correctness of answers, explanations. Students familiar with the theoretical foundations of research based on the developed program participated in the experiment, over a span of which in the course of explanation the topic of the classes, they were evaluated (they were acquainted with the evaluation criteria). The number of questions raised by them, announced proposals, corrections, independence, initiative were evaluated. During three different classes (three topics) out of 30 participants 7 students (23.3% displayed clear activity, creative approach), half of the group (15 students) simulated activity (provided suggestions, their answers were formal), the rest were passive and indifferent. At the same time, the theoretical component, i.e., answers, explanations were correct at 16 participants (54%), 8 students (almost 25%) did not disclose the content and did not give concrete answers. The rest of answers were evaluated as unsatisfactory.

In technical performance (preparatory procedures for the first conditionally resultative) operating procedures (precision, elapsed time, accuracy, ingenuity) were evaluated. 12 participants (6.7%) managed with an excellent mark. Among them, those who were active from the beginning. The rest met with the task satisfactorily, copied the actions of predecessors with mistakes. The implication is that only 9 participants of the experiment can work on their own and do it effectively.

The main evaluation in the experiment was the test result. The method of expert evaluation allowed the students to evaluate the results of testing themselves. The tests contained questions on the subject matter of the classes (up to 21 questions). An individual response that was not signed by the respondent was evaluated. At the same time, the answers of 9 participants coincided with the opinion of the rest students. The opinion of almost half of the involvants coincided with 2-3 places, the rest did not correlate with the data and this was the final evaluation.

The following method, which was used in expert evaluations, is called the feedback method. This method is based on enlist the experts' conclusions. Answers of experts are summarized, passed them back, upon that the experts clarify their answers. That is, the students who had the highest number of points gradually dropped out of the rating, in other words, the estimated number of mistakes made was evaluated. The selection of students for research work was as follows. If after a while the same tasks were repeated, the number of errors did not decrease significantly - they were not considered capable of research. Among the most commonly widespread mistakes made by the students were the following: while formulating the hypothesis, respondents sometimes do not take into account the points contradicting the advanced hypothesis; do not distinguish the main from the secondary; allow for premature generalizations and conclusions.

It should be emphasized, that utilized methods of differentiated evaluation greatly increased the effectiveness of the learning process. At the beginning of the planned studies, 53% of respondents showed a low interest in the research topic, but at the end of the year their interest grew up to 20%.

Conclusions. It has been established that the direct link between the educational establishment and scientific laboratory is that, through the educational process (curricula, testing, etc.), attract and select the prospective students with a patronage for their further involvement into scientific researches.

The developed analytical, predictive, reflexive and other abilities of biologist students allow, based on partial (preliminary) results, to predict and forecast the result of their professional research activity, to identify abilities, including perseverance, which in its turn gives preference to other qualities, and

in the absence of the necessary abilities - to develop them in the ordinary course.

The analysis showed that the peculiarities of the creative approach in combination with the algorithmic components of the activity can be considered as a psychological and pedagogical problem, the solution of which may consist of creation of previous models, in particular, the development of future specialists' abilities to research activity.

Based on the study of the relevant components of students' behavior, their knowledge and skills, a technological model for assessing the cognitive abilities of future biologists to research activity has been developed. The technology of abilities evaluation is designed for a differentiated approach involving various methods, ways of identifying potential capacities of future professionals for research activity and motivating interest in this affair.

The study of some aspects of the problem of competitive researchers training is the goal of further scientific research.

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