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Development of Higher Education Students' Creative Abilities in Learning and Research Activity.

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ABSTRACT

The relevance of the paper is related to the necessity to develop the creative abilities of students who are able to be professionally realized in a society in the conditions of rapid social and information changes. In connection with this, there is a growing need to develop probable paths of students' abilities forming for creative activity as the basis for their future self-determination and self-improvement. The research is aimed at initiating the students' learning and research work in the course of vocational training in the University to develop and realize their creative abilities. The authors propose a program-targeted approach to the development of learning and research creativity of students, the main feature of which is the priory of activities goal-setting. The following aspects are determined: the criteria for university students' creative activity; stages of creative self-development of the student; components of the system of creative activity of the university student (motivational, operational, diagnostic, and resultant); algorithm of student's creative activity; methods, forms and means of realization of creative activity in the process of vocational training of students in the university. The aspects selected by

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the authors make it possible to compile and implement a personal program for self-development of the creative abilities of each university student. The paper is intended for educators and psychologists, the scientific community, dealing with the formation of creative abilities of students in the learning and research activities.
Keywords: vocational training, the learning and research creativity, self-development of students, creative activity, and program-targeted approach

INTRODUCTION

Modern society needs creative, vocationally mobile professionals capable of taking effective, non-standard solutions in new socio-economic and technological conditions. Creativity is one of the forms to manifest the active personal position, in the result of which students not only create something new for themselves, but also acquire important personal traits [1]. This circumstance necessitates the creation of technologies for the formation of a vocationally creative personality of a specialist that include the goals and objectives of education and upbringing, the forms and methods of organizing the educational process, the criteria for selecting and structuring the content of education, and, most importantly, the modern concept of pedagogical Management of the student's creative self-development [2, 3].

The question of the development of creativity and its foundations was considered by psychologists V.N. Druzhinin [4], A.N. Leontiev [5], S.L. Rubinstein [6] and teachers V.I. Andreev [7], V. P. Bespal'ko [8], O.S. Grebenyuk & T.B. Grebenyuk [9], V.I. Zagvyazinsky [10] and others.

The analysis of scientific, pedagogical and methodical literature has revealed the contradictions between the tasks posed in the curriculum of disciplines of various cycles and their implementation [11, 12, 13]. The study of the current state of disciplines' teaching in university practice has shown that the formation of experience in the creative activity of the student in the process of teaching by teachers is not always planned; this process is spontaneous, due to the fact that the role of development of creative abilities is underestimated. The consideration of creativity in the methodological aspect allows us to speak of it as a quality inherent in human thinking and practical activity. In this case, creativity is an organized process [14, 15, 16]. On the other hand, creativity can be perceived as an invention, or artistic creativity, which places the highest demands on human thinking and action. Analysis of creativity at the first level allows us to conclude that creativity is a qualitative characteristic of any kind of human activity, and not the prerogative of selected occupations and fields of activity [17]. At the same time, the assertion that in the most vivid concentrated form creativity manifests itself in science and art does not lose its meaning. The multidimensionality of creativity presupposes a multiple set of criteria, the most common of which are two: the creation of a qualitatively new product; free self-development of the individual as an entity of creativity. The most important question for teachers is of the criteria and levels of creativity of the educational process itself. The creativity seems to us to contain in it both reproductive and productive components and possesses a dialogic nature. Reproductive is acting as a link with the potential that has been accumulated in this area by

previous generations; it collects, accumulates and creates the prerequisites for the emergence of productive one. The reproductive component, as a rule, serves as a means. The impossibility of explaining new facts on the basis of existing theories is an internal mental dialogue when the entity of creativity is reasonably opposed to traditional knowledge. The dialogue acquires its special importance in pedagogical activity. Only in the conditions of the dialogue between the teacher and student the transformation of the traditional educational process into the educational and creative cooperation is possible [18, 19].

The purpose of the study is to determine the set of pedagogical conditions that contribute to the intensification of the students' vocational creative self-development.

Tasks of the study:

1) to justify the program-targeted approach to the development of students' learning and research creativity;

2) to reveal the organizational and pedagogical conditions that initiate the independent creative work of students; 3) to define methods, forms, means of realization of learning and research creative activity of students;

4) to test experimentally the effectiveness of the program-targeted approach to the development of learning and research creativity of university students.

MATERIALS AND METHODS

The students of the historical, physical, biological, philological, mechanical-mathematical faculties of the Kazan Federal University are experimental base of the research. The total sample of students was 340 people.

The tasks set in the study were solved through a set of complementary methods: a theoretical analysis of philosophical, psycho-pedagogical literature; observation of students in the course of learning activities; questioning, pedagogical testing, content analysis of students' creative work, mathematical methods of processing experimental research data.

We have determined the methodological and theoretical and practical positions on a number of fundamental issues on the problem of the creative work of university students:

1) *The criteria for the creative activity of university students are formulated:*

• the problematic nature in the presentation of the initial conditions for activity in creativity;

• absence of an algorithm for solving a creative problem;

• inclusion of intuitive components for thinking of the entity of creativity;

• support of intellectual activity by dynamically changing emotional processes, from the state of crisis when revealing seemingly insoluble contradictions and to euphoria, when a solution is found; informative creative scientific search for the necessary information to solve the task (unlike uncreative - finding already known knowledge).

2) *the system-forming factor of creative activity and creative personality* has been defined - the goal, which integrates the past, the present and the future into itself. In the psychological

sense, the goals of the personality determine its life strategies. In the conditions of traditional education, students are not taught independent goal setting. Goals are formulated by the teacher without participation in the process of goal-setting of the students themselves that excludes their internally-motivated acceptance. This situation excludes the influence of the teacher on the motivational structure of the student sphere, creating the effect of alienation from learning activities (see **Figure 1**).

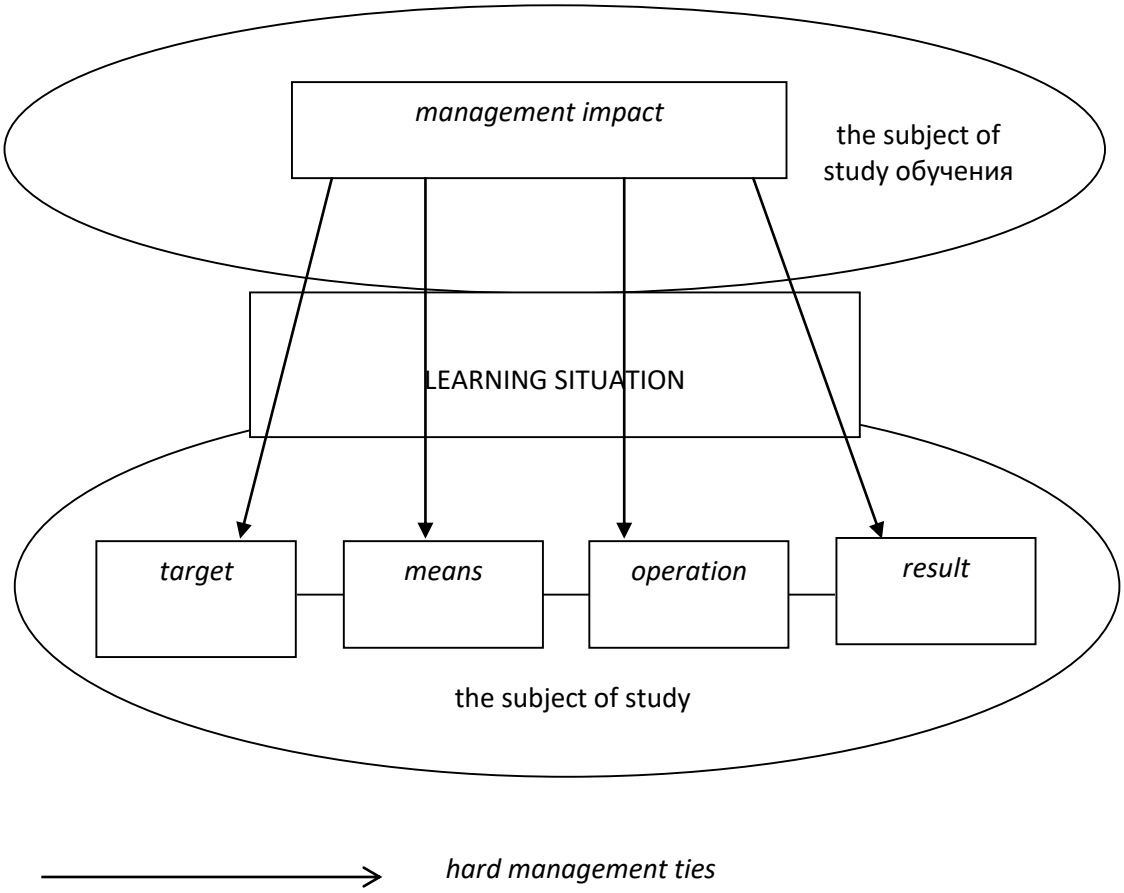

Figure 1. The scheme of pedagogical management in the conditions of the traditional system of education

In the creation of learning and creative situations or the setting of research tasks within the teaching of students in the university, the nature of communications within the pedagogical management of students' learning activities changes substantially (see **Figure 2**). Then the goal becomes the basis for the formation of the information base of instruction, the forecasting of its results, it determines the means and forms for the solution of pedagogical tasks, it acts as a criterion for the optimality of the pedagogical decisions being made, it determines the formal and informal structure of interactions among the participants in the educational process, it serves as a benchmark for monitoring and evaluating the learning outcomes at different stages.

3) *a program-targeted approach to the intensification of the learning and research creativity of students is offered,* the feature of which is the priority of the main goal, focus on the final result.

The goal in the conditions of its practical implementation fulfills the following functions: 1) integrating (integration of activities based on knowledge); 2) motivating (encourages activity); 3) constructive (builds activity).

The program-targeted approach to intensifying the learning and research creativity of students has the following stages:

- pre-target stage: study of the state of learning and research creativity of students and possible changes of this system in the future, identification of problems, reserves;

- target stage: formulation of the main goal, decomposition - alignment of the hierarchy of goals;

- programming stage: development of a strategy for the implementation of goals, a description of activities and ways to achieve the goals in stages;

- organizational stage: the creation of a system and management bodies;

- practical stage: implementation of programs by relevant organizations;

- diagnostic, controlling stage;

– resulting stage: summing up, correction of programs.

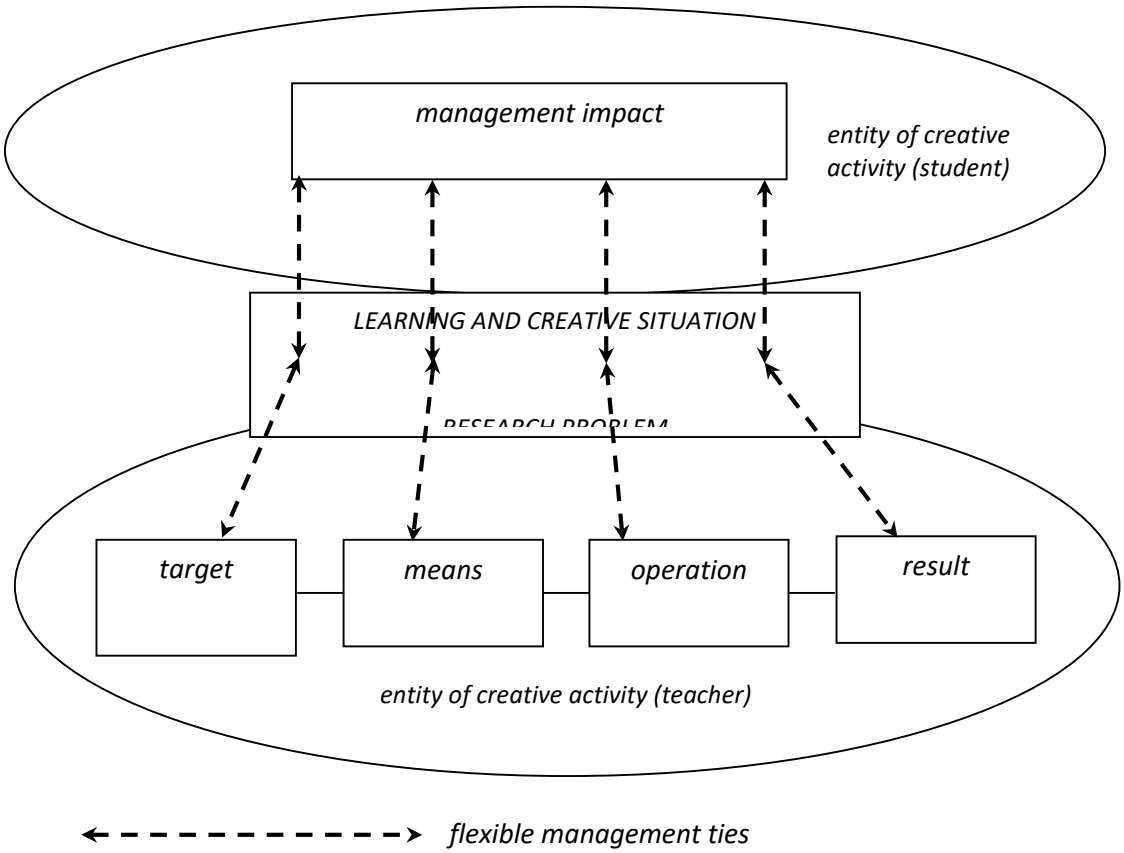

Figure 2. Scheme of pedagogical management in the conditions of learning or research creativity

4) *A model for the development of students' creative activity*, based on the implementation of purposeful self-management by the process of assimilation of knowledge and skills (the model that forms creativity) is proposed. Its task is to identify the creative potential of each student, to maximize its development on the basis of identifying actual and potential opportunities for the personality of students in the learning process. The creation of programs for the creative self-development of the student begins with the first course by identifying the actual level of development of the creative abilities of the personality of each student by specially developed techniques. Based on the diagnostic data, each student makes up a personal program of self-development of creative abilities. This program is adjusted every academic year, taking into account group and faculty programs of learning-research and scientific-research work of students.

The main principles for making the program are: strict individuality; complexness, which manifests itself in the development of a holistic unit of the personality's properties that are dominant for creativity; the expressed target setting for creativity in the chosen field of activity; scientific validity; continuity of learning and research creativity.

Particular attention is paid to the formation of students' abilities to identify contradictions, to see and formulate scientific problems. The importance of this component of research activity was emphasized by many outstanding scientists.

Another no less important task that must be solved on the basis of these programs is mastering the methodology of scientific research and creativity. If in the first year students get acquainted with the general theoretical positions, methods of creative activity, then in the second and third years they must master the methods and in the completion of training (last years) - the principles of scientific creativity, which form the basis of the student's scientific outlook. The developed programs are integrated into the educational process within the framework of the author's pedagogical system of preparing students for creative activity.

5) *The components of the creative activity system of the university student are outlined:* motivational - target; operating; diagnostic and resultant.

There are complex functional ties between these units and their components (see **Table 1**).

Table 1. Structure of learning / research creative activity of the student

Units of creative activity	The algorithm of creative activities of student
Motivational-target unit	1. Awareness of private goals in work.
	2. Reproduction of knowledge related to the problem in question.
	3. Episodic control.

Operating unit	4. Adoption of goals, general and private, in dealing with the chosen problem.
	5. Adoption and application of methods of action - application of knowledge and selection of necessary conditions for solving the problem under consideration.
	6. Adjustment of activities.
Diagnostic unit	7. Definition of general and acceptance of partial objectives of activities.
	8. Partially independent systematization and generalization of knowledge.
	9. Evaluation of the result of the activity from the point of view of conformity of the way to solve the problem. Identification and correction of errors.
The resultant unit	10. Definition of the general and private purposes of activity.
	11. Identification, selection and application of methods of action, the definition's place of a new solution in the knowledge system.
	12. Evaluation of the results of creative activity from the point of view of practical significance, rationalization of the decision

In the context of creativity, the most important goal of education is the transition of the student from the position of the object of pedagogical management to the state of entity of self-government. From this statement it follows logically that the degree of formation of subject qualities of the student can be accepted as a criterion for assessing the effectiveness of the functioning of the pedagogical system.

6) *Groups of pedagogical methods aimed at the formation of creative activity are systematized:*

-task methods, characterized by a phased organization of setting didactic tasks, choosing methods for their solution, diagnosing and evaluating the results obtained;

- training methods, including the system of activities for working out certain algorithms of learning and cognitive actions and methods of solving typical problems in the course of training (tests and practical tasks with elements of creativity);

- game methods, characterized by a game form of interaction between the entities of the educational process; educational tasks, included in the content of the game.

- methods with application of constraining conditions: a method of time restrictions, a method of sudden prohibitions, a method of new variants, a method of information insufficiency, a method of absurdity;

- methods of group solution of creative problems: the Delphi method, the "black box" method, the method of diaries;

–methods of collective stimulation of creative research: the method of brainstorming, synectics;

- methods of emotional impact, forming experience through the experience of one's own occupationally - creative and learning -cognitive activities and create an attitude toward a positive emotional attitude towards it (encouragement, learning-emotional game, creating a situation of success, stimulating evaluation, free choice of creative tasks, motivation to choose alternative decisions, emphasizing the personal significance of students;

- methods for forming the occupational readiness of memory based on the operation of occupational knowledge and skills. Its development is facilitated by the occupational content of activities in general and specific tasks in particular.

The positions developed by the authors allowed ensuring the formation of the skills for self-management and self-organization of university students with a creative orientation toward learning and research activity.

RESULTS

Organizational and pedagogical conditions that initiate independent creative work of students

The authors developed a set of pedagogical conditions that determine the transition of students' educational activities to educationally-creative work, and from it to scientific creativity. This complex consists of three independent groups of pedagogical conditions:

1) *the conditions for the formation of a reflective position of students*, which is understood as a system of developed reflexive abilities of the individual: the objectification of the person's knowledge of itself (obtaining and analyzing information about intellectual, emotional, volitional spheres of the person under competent control); the student's analysis of the peculiarities of his or her educational and educationally-creative activities; self-knowledge of the features of self-government; studying the structure and functions of future occupational activities; training and possible correction of the style of educationally- creative activity.

2) *the conditions for the development of the creative abilities and skills of students*, including: acquaintance with the general theory of creativity; the analysis of individual psychological barriers in creative activity; teaching methods and techniques of solving non-standard educationally- creative problems and tasks; pedagogically grounded compilation and implementation of targeted individual self-development programs for students.

3) *the conditions that determine the optimal interaction of the teacher and student in the teaching and educational process:* entity - the subjective concept of relations in pedagogical systems; pedagogically justified ratio of reproductive (normative) and productive (abnormal) in the content and forms of instruction; the presence of a creative thesaurus which is not lower than the optimal one for a teacher; step-by-step transition from pedagogical management to co-management and from it to self-management on the basis of the program-target approach.

Stages of development of creative abilities and skills of students

On the basis of analysis of the literature and preliminary research, three stages of experimental work were previously and conditionally identified: *propaedeutical, creatively oriented and occupationally-creative.*

The first stage *(propaedeutic)* covers first-year students and includes the following tasks:

- pedagogical management for formation of culture of student educational activity: formation of psychological, psycho-physiological, ergonomic culture of intellectual activity; mastering rational reading techniques and methods of working with educational and scientific information; development of culture of thinking;

- pedagogical management of the process for adaptation to the conditions of the university: awareness and development of a new social role - "student"; the development of a new, social, socio-metric status in the new newly formed contact environment - the student group; adaptation to the university forms for the organization of the educational process; awareness of personal difficulties in learning and correction of the style of learning activity;

- instilling the skills of self-management and self-organization with a creative orientation to learning and research activities.

The second stage (creativity oriented) covers second-year students and includes the following general tasks:

- vocationally-creative self-determination of second-year students (choice of specialization);

- improvement of knowledge and skills in the collection and processing of scientific information.

The third stage (occupational and creative) includes third-fourth year students and solves the following main tasks:

- mastering the methodology of scientific creativity;

- improvement of knowledge and abilities of vocational creative nature.

Forms of realization of learning and research creative activity of students

- organization of a cycle of psychological and pedagogical studies within the framework of special courses "Introduction to the specialty", "Culture of student learning activities", "Fundamentals of the culture of learning and research creativity of students" at the first courses of the historical, physical, biological, philological, mechanics and mathematics faculties of Kazan Federal University (KFU);

- introduction of author's developments in the course "Pedagogy and Psychology" for students of all specialties in the chemical, historical, physical, biological faculties;

- organization and management of the student research club and student problem-research group;

- conducting training and theoretical classes on the development of learning and research creativity of students with the teaching staff of the university;

- development of creative assignments for psychological and pedagogical Olympiads of students and organizational and methodological work on their conduct.

Within the framework of the ascertaining experiment conducted at the historical, physical, biology-soil, philological, mechanic-mathematical faculties of Kazan Federal University, it was revealed:

• a sharp drop in interest in research work during the training. If in the first year 72% of the students surveyed had a desire and interest in research work, then by the second year the number of such students fell by half and a gradual decrease in interest in it was observed before the graduate course;

• only 4% of the students surveyed possessed clearly formulated vocationally and creatively defined goals of strategic level (long-term) on the basis of an in-formation-reliable representation of the future specialty;

• for most students, the basis for choosing a university was not targeted occupationally creative attitudes, but academic achievement in the subject;

• up to 70% of respondents are disappointed in the future profession at the third course.

Based on the results of the experiment, the following groups of students can be identified:

• *creatively-oriented:* who are characterized by early motivation for creativity, possess a sufficiently formed structure of creative values that occupy a system-forming place in the personality structure; this established structure determines all the activities of students (learning, communicative, leisure, program-forecast one, etc.). Such students number is 4-5% of the total sample;

• *creatively adaptive*: there are creative components in the system of value orientations of the students of this group, but the structure and "weight" of it are strongly influenced by conditioned (external) and initiating conditions. Conditions that do not contribute to the realization of the creative potential of these students are capable of sharply reducing the motivational and value potential, or even completely blocking it; in a favorable situation, these students have a stable focus on creativity. The students of this group make up 68%;

• *creatively not oriented:* the value orientations of the creative aspect in the system of their values are poorly represented or have a declarative nature. This group is 28% of the total mass of students.

To work with these groups on the program-target basis, a system of correctional and developmental aspects was created within the framework of the forming experiment.

The effectiveness of the experiment was determined with the help of a number of techniques (self-assessment, self-management, creativity) and evaluation of products of students' creative activity. In the experimental groups there was a positive dynamics in the indicators of creative thinking, curiosity, originality, imagination, intuition, emotionality, creative attitude to the profession, ability to self-management.

For the experimental check, five groups of students were selected: two control groups (CG_1 and CG_2) and three experimental ones (EG_1, EG_2 and EG_3). Control groups are randomly selected groups of students of KFU receiving humanitarian education (CG_1-72

people) and natural science (CG_2 84 people), in the training curriculum of which psychological and pedagogical disciplines are provided. As experimental groups EG_1 (63 people), EG_2 (54 people), EG_3 (67 people), the humanities students and natural scientists were selected, in the work with whom the program-target approach was realized within the framework of the forms of creative activities.

Dynamics of students' progress in terms of creative development levels is presented in **Table 1**.

Table 1. Dynamics of students' progress in levels of creative development (in% of the total number for each group)

Levels	Groups									
	Before the experiment					After the experiment				
	EG	EG_2	EG_3	CG_1	CG_2	EG_1	EG_2	EG_3	CG_1	CG_2
High (Research and creative)	-	-	7	-	-	35	37	46	6	9
Average (Learning and creative)	36	29	21	42	34	51	51	54	56	52
Low (Reproductive-adaptive)	64	71	72	58	66	14	12	-	38	39

The analysis of the results revealed statistically significant differences (according to Student's criterion, significance level - 0.95) between the indices in the level of development of the creative abilities of the students in the experimental and control groups at the control stage of the experiment, although there were no differences between the groups at the ascertaining stage. The growth in the development of the creative potential of students (in the personal, productive, process-activity aspects) is obviously the result of the psychological and pedagogical work carried out within the framework of the selected forms of teaching.

DISCUSSION

In the modern psychological and pedagogical literature, various aspects of the problem for the formation of the creative personality of the future specialist are covered in the works of V.I. Andreev [7], V. P. Bespal'ko [8], O.S. Grebenyuk & T.B. Grebenyuk [9], V.I. Zagvyazinsky [10], and others. The role of the independent scientific research activity of students in their creative development [20, 21, 22, 23, 24] has been examined in sufficient detail, organizational forms of students' research work [25] have been studied, historical and theoretical analysis of SRWS (scientific-research work of students) [26] has been done, the possibilities for evaluating the effectiveness of research work of students [27] were revealed, attempts were made to specify the place and role of SRWS in the system of higher education

[22] , the interrelations between the educational and extra-curricular research activities of students are clarified [11].

However, the problem of goal-setting in self-development and self-management of learning and research activities of university students was not considered comprehensively. The authors *proposed a program-targeted approach to intensifying the learning and research creativity of students*, the feature of which was the priority of the main goal, the focus on the final result. For its implementation, a set of pedagogical conditions has been developed that determine the transition of students' learning activities to learning and creative activity, and from it to research creativity [28, 29]. This complex consists of three relatively independent groups of pedagogical conditions: the conditions for the formation of reflective abilities of the student's personality and positive motivation for research creativity; conditions for the development of a culture of creativity of students on the basis of personal self-development programs; conditions that determine the optimal interaction of the teacher and student in the educational process by the program-target concept, which is the basis of the entire teaching and educational process.

CONCLUSION

General recommendations for planning educational activities that stimulate the learning and research creativity of university students can be formed in the following form:

1. Encouraging students to self-goal-setting (selection of goals, objectives, means of their solution), relating not only to training activities, but the strategic goals of one's life strategies;

2. Initiation of intuitive mechanisms of thinking, when students have to make a guess or supposition.

3. Educating of students' self-confidence, as an important trait of the personality underlying the independent, active behavior. It needs to be clarified that reassessing by the trainees of their potential is less dangerous than underestimation, except in cases when a pathologically high self-esteem is observed;

4. Provision a positive emotional background of educational activity, since negative emotions are a powerful blocking factor for the creativity of students;

5. Development of imagination and fantasy, even if it borders on absurdity from the standpoint of rationality;

6. The formation of students' sensitivity to contradictions, the ability to discover and consciously formulate them (the main role of contradictions in thinking activity lies in their ability to serve as a source of new questions and hypotheses);

7. Application of problematic methods of teaching, teaching special heuristic methods of solving problems that stimulate the focus on independent (or with the help of a teacher) discovery of new knowledge;

8. Realization of joint research creative activity of the teacher and student. In a situation where the task is being solved, the answer to which neither the student nor the teacher

knows - the task turns from a learning one into a real research or production problem, which enriches and strengthens the field of motives that contribute to creative activity.

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