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THE DEVELOPMENT OF UNIVERSITY STUDENTS' COGNITIVE CAPACITIES

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Abstract
This article aims to identify the conditions for successful development of the cognitive potential of students, taking into account the content of professional education and interdisciplinary integration in high school; disclosure of the essential characteristics of cognitive function (level of cognitive processes of students, the flexibility of their thinking, reflective thinking, convergent (productive) and divergent (creative) abilities, the ability to operate with conceptual systems, etc.); development of the main sections of the cognitive potential of students (of values, cognitive, of the activity); the main stages of cognitive development (beginner, forming, final); activation of student cognitive potential mechanisms. In the article there was identified the criteria of allocation of levels of development of students' cognitive capacities; it disclosed the essence of the concept of "cognitive capacity" (the presence of significant cognitive information; intellectual ability, the willingness of the individual to the practical implementation of the knowledge, etc.); it proved the necessity of development of University students' cognitive capacities through an active process of construction of knowledge in terms of autonomy and goal-setting; it proved the need for support certain principles for the development of the cognitive capacities of students (interdisciplinary integrative knowledge; axiological goal setting, personal aspect of training; self-construction of the educational route, expanding the experience of cognitive activity).

Keywords: University students, cognitive development, theoretical knowledge, practical experience, information culture, professional competence, intellectual ability, construction of knowledge.

Introduction

Actualizing the problem

The main transformations taking place today in the modern Russian education are related to the integration of Russia into the world educational space that offers, on the one hand, new opportunities, and on the other, new demands on university graduates. So now we demand specialists with not only professional knowledge and competences, but also owning modern educational technologies (Kalimullin, 2017; Valeeva & Karimova, 2014; Masalimova & Shaidullina, 2017). In connection with this required modernization goals, methods and conditions for the development of cognitive capacities of students as the ability of reproduction of their knowledge and skills to solve problems are related to professional self-determination. Relevance of the research potential of students' cognitive development due to such a contradiction as the presence of objectively existing preconditions for purposeful development of University students' cognitive capacities and the lack of theoretical elaboration of organizational and pedagogical conditions aimed at his development (Valeeva et al., 2015). In particular, this is due to the formation of students' ability to accumulate, use and create knowledge in a certain area from the point of view of the expanded reproduction of knowledge, their accumulation and implementation of

professional activity. In this case, it refers to the use of the term "cognitive capacity" in such ways as the ability to find any significant cognitive information; abilities and skills, which are based on knowledge of how to do something and to implement; a special form of epistemological relationship of the individual to the activity (V.I. Ginetsinskii, 1992).

Explore importance of the problem of the development of University students' cognitive capacities in terms of their constituent components

The study of the problem of development of University students' cognitive capacities is related to the issue of verification of his intellectual property as a subject that is of interest in the framework of educational relations in connection with the presence of the following set of cognitive capacities structure: *motivational component* (intrapersonal structure and mechanism of readiness of the individual to the actualization of ability and socio-psychological installation on the deployment of his essential powers: the needs, values and motives (A.K. Markova, 1990), *cognitive-information component* (the student's possession of the system of professional knowledge, skills, attitudes and world outlook, complemented by capacity unit of special abilities purely professional oriented (S.V. Kuzmina, N.V. Vlasihina, 2013); *activity component* (the possession of a student activity and means of expression, aimed at the formation of his mind and active intellectual activities in order to achieve the goal of readiness for self-development and self-actualization, training to self-employment and the development of personal qualities (S.D. Smirnov, 2001); potential *genetic component*, i.e. individual abilities (they include qualitative and quantitative characteristics of individual mental processes that constitute a whole, unique and internally consistent property, aimed at the realization of the vital functions (I.V. Lamash, 2005).

Conditions of the development of University students' cognitive capacities

Students' cognitive capacities are the result of a cognitive process of the institution, which is formally expressed in the relationship of its educational and scientific process. In this regard, the cognitive process is actualized in the cognitive environment including a university educational system, innovative educational technologies, means of communication between the subjects of the educational environment. On this basis, the implementation of fostering the development of cognitive potential of students is carried out through the following conditions: 1) Improving students' cognitive processes (perceptual processes: sensation, perception, attention, which helps to get information from the external and internal environment; mnemonic processes: storage, preservation, reproduction information; intellectual processes: thinking, imagination, speech, whose main function - replenishment of the information, the exchange of information, a product information); 2) Taking into account peculiarities of the need-motivational sphere of students (the actualization of the higher level needs aimed at self-education, self-development, self-realization, growth, discovery and realization of cognitive capacities, including deliberate targeted motivational attitudes and beliefs); 3) Creating conditions for the cultivation of the self-concept of student's personality (formation of psychological installation of the student in relation to itself, its features, capabilities and opportunities); 4) Provision of conditions for the realization of creative abilities of students (which includes the level of cognitive creativity and individual abilities that make it up: flexibility, originality, developed of ideas); 5) The creation of infrastructure for the expansion of the culture of the university academic work (the rational organization of the educational process, the efficiency of the methods, techniques, learning technologies, scientific organization of intellectual labor, etc.); 6) Creating an atmosphere of cooperation and collaboration between all the subjects of the educational process at the university (aimed at the effective assimilation of educational material, the production capacity to perceive the different points of view, the ability to cooperate and resolve conflicts in the process of collaboration, etc.).

Status of a problem

To date, the pedagogical science has accumulated a certain fund of knowledge needed to solve the problem. A detailed analysis of scientific papers showed that intelligence is investigated at three main levels of its functioning: methodological, theoretical and practical. The definition of objective reasons, factors and essentially-categorical characteristics of intelligence was done by M.D. Dvoryashina (1973), E.M. Kedrova (2005) K.W. Fischer (1980); different approaches to the concept of intelligence were

examined by scientists G.Y. Eysenck (1995), N.V. Vidineev (1989), M.A. Kholodnaya (2002); identifying the structural, morphological, instrumental and methodological components of intelligence was done by D.V. Ushakov (2007), S. Lutz & W. Huitt (2004), W. Stanton (1993); the development of tools ensuring the technological development of intelligence was led by Y.A. Karpova (1998), P.V. Shatilo (1998), J.B. Carroll (1993); in the creation of intellectual and pedagogical concept there participated scientists J. Brooks & M. Brooks (2000); there were tested special development technologies of intelligent features in the works of S.D. Smirnov (2001), R. Sternberg (2001), B. Eylon & M. Linn (1988); intellectual processes of students were analyzed by J. Bruner (1990), J. Greeno (1989), D. Phillips (2000); aspects of intelligence development were examined in works of O.V. Bakhtina (2007), V.P. Ivanova (2013), W. Huitt (2002); psycho-educational provision for the integrative nature of the individual aspects in the psychological, social, biological, and the active development were studied by B.G. Ananiev (1968), A. Demetriou & S. Kazi (2001), M.A. Suizzo (2000); the idea of subject pedagogy was considered by Yu. Azarov (2002), N.P. Goncharuk (2004), J. Dewey (1998); theoretical principles of modeling in the training were offered by V.V. Afanasiev (1981), B.M. Velichkovskay & M.S. Kapitsa (2006), M. Driscoll (2001).

The considered problem suggests the study of resource innovative aspects of the organization of the development of students' cognitive capacities in order to create productive information-cognitive space for the formation of future competitive specialists.

Hypothesis

Analysis of theoretical studies and practical activities in the aspect of the problem developed showed that the development of University students' cognitive capacities can be successfully realized if the following conditions are met:

- Implemented conditions of intensification of the development of University students' cognitive capacities (level increase of student cognitive processes; accounting peculiarities need-motivational sphere of students; the creation of prerequisites for nurturing self-concept of the individual; the creation of infrastructure for expansion academic work culture of the university, etc.);
- Carried out reliance on principles of students' cognitive capacities (interdisciplinary integrity of knowledge; axiological goal setting; personal aspect of training; self-construction of the educational route; expanding the experience of cognitive activity);
- Developed and used the main sections of development of University students' cognitive capacities (evaluative, cognitive and active);
- Put into practice a structural model of students' cognitive capacities (ensuring the integration of the content of the humanities, specialized and professionally oriented subjects; the creation of educational space of the university based on the organization of educational and extra-curricular activities at all stages of professional formation of the future expert; the expansion and modernization of forms of social and cultural interaction of students with the intellectual university potential; the construction of the social and professional background of the future specialist in the process of humanitarian and special training).

Materials and Methods

The tasks of the research

In the study, the following tasks were set: 1) To analyze the essential characteristics of the student's cognitive sphere based on his level of cognitive processes and on this basis to disclose the essence of the concept of "cognitive capacity"; 2) To identify the conditions for a successful implementation of the revitalization of students' cognitive capacities; 3) To work out the main topics of the cognitive potential of University students (of values, cognitive, of the activity); 4) To define principles of students' cognitive capacities); 5) To develop a structural model of the development of students' cognitive capacities.

Theoretical and empirical methods

Research methods: theoretical analysis of philosophical, psycho-pedagogical and methodical literature; Generalization of pedagogical experience; The analysis of curricula, educational programs, teaching aids in specialized disciplines; Questioning, interviewing, pedagogical observation; Self-analysis and self-evaluation by students of the level of development of their cognitive capacities; Conversations, written

and oral interviews, testing of students; Pedagogical experiment; Analysis of the results of the search activity.

The trial infrastructure and stages of the research

The basis of the study was the Institute of Physics of the Kazan (Volga region) Federal University. The study was conducted within the framework of teaching students the specialties "Pedagogical Skills" and "Theory and Technology of Education". The study was conducted in two stages:

At the first stage (September 2015) students developed ideas about cognitive potential as a possible strategy for professional growth; Intellectual and cognitive qualities in and increase of motivation to self-actualization of cognitive capacities was developed; The state of the problem was studied in the scientific literature and educational practice; The empirical material was collected; The nature of students' relationships with the problems of mastering the culture of thinking was studied; The ability to analyze and generalize the study material was studied, etc.

In the second stage (May 2016), there were designed principles and guidelines for researching the development of University students' cognitive capacities; carried out an experimental verification of the implementation of the model of development of students' cognitive capacities, the possibilities of its direction for actualization and development of intellectual and cognitive qualities of students; carried out the registration of research results.

The model of development of University students' cognitive capacities student cognitive capacities

Based on the dynamics of the implementation of the model in the course of developing the cognitive capacities of students three stages of this process a.e distinguished in the form of links of a single trajectory of intellectual development: the stage of student adaptation, the stage of his intellectual self-development and the stage of his professional identification. Thus, the design of the model of the development of students' cognitive capacities is built on the following basis: Ensuring the integration of humanitarian, special and professionally oriented disciplines; Creation of the educational space of the university, taking into account the interrelation of educational and scientific activity at all stages of the professional formation of the future specialist; Expansion of forms of sociocultural interaction of students with the intellectual potential of the university; Design in the process of preparing the future specialist of his social and professional model.

The success of the realization of the model of the development of students' cognitive capacities lies in its dynamic character and focus on actualization and creative competence of students. It means the development of intellectual potential and cognitive activity of students; that is the development of creative potential, innovation and independent scientific activity of young people. And this suggests the following: the formation of students' ideas about intellectual potential as a possible strategy for professional growth; Providing skills and knowledge related to the overall development of intellectual and cognitive qualities in students as future professionals; Development of personal qualities and skills underlying cognitive thinking and creative behavior (creativity, initiative, risk, independence, self-confidence, leadership qualities, etc.); Development of specific research projects and grants. All this should be done under the appropriate conditions, such as: increasing the level of cognitive processes of the student; Taking into account the specific features of the students' motivation and needs; Creation of prerequisites for nurturing the student's self-concept; Provision of conditions for the realization of the creative abilities of the student; Creation the conditions for cooperation among all subjects of the educational process in the university. These conditions, based on the model of the development of students' cognitive capacities, suggest the following principles: Organization of interdisciplinary integration of knowledge; The existence of a value-setting goal; Accounting for the personal aspect of learning; Provision of conditions for the independent design of the educational route for students; Expansion of students' experience of cognitive activity.

Criteria for the development of University students' cognitive capacities

The main criteria for the success of the development of students' cognitive capacities are the following: The extent to which the student covers the sections of the curriculum in the discipline and the understanding of the interrelationships between them; The depth of the student's understanding of the substance of the issue under discussion, its relevance and scientific and practical significance; The

student's ability to build logically, correctly, consistently and reasonably conclusions on the problem under study; Demonstration of a high level of independent thinking with elements of a creative approach to the presentation of material; Range of the student's knowledge of the necessary educational literature on specialized disciplines. In the course of development of cognitive capacities students should adhere to a certain scheme of solving the tasks assigned to them in the relevant disciplines: The analysis of problem systems and the selection of a specific task; The analysis of the problem studied and development of a model for its solution; The analysis and wording of the conditions of the problem; The analysis and wording of the conditions for solving this problem; Search for ideas for solving this problem (based on the principle of action); Synthesis of different approaches to the solution of this problem. And for this, based on the criteria for the development of cognitive potential, students of the university must master the following skills and abilities: Mastering general scientific and private scientific methods of cognition; Mastering the culture of thinking; The ability to analyze and summarize information; The ability to set a goal and choose the best ways to achieve it; The ability to think creatively and unconventionally; Possession of a system of concepts in the field of own profession; Possession of skills and experience of research; The ability to correctly format the results of own activities; Mastering the skills of scientific research and the ability to organize and set up an experiment; Desire for self-development and improving the skills.

Results

Levels of students' cognitive development

Being the chief component of cognitive activity cognitive potential plays an important role in the professional development of students. Accordingly, the existing system of intellectual development of the student (system-forming components here are self-knowledge, intellectual self-determination, self-management, self-actualization) will be the determining factor of a young man's formation and self-development. Based on this, during the study the cognitive capacities of the student were determined to which we refer the corresponding blocks of the actual state of the given potential:

I block:

1) The existence of a strong assimilation of knowledge in special and related disciplines;
2) The degree of the curriculum sections coverage in the discipline with a clear understanding of the interrelationships between them;
3) Formation of ideas about cognitive potential as a possible strategy for professional growth;
4) Clear understanding of the relevance and importance of one's own research activities;

II block:

5) The presence of analytical and creative thinking;
6) The presence of the initial systematic skills of performing theoretical and experimental research works;
7) The availability of skills to apply theoretical knowledge in the course of solving specific practical problems;
8) The availability of skills for the development of research projects and grants;

III block:

9) The ability to combine the educational process with research activities;
10) The ability to synthesize different approaches to solving the problem;
11) The ability to draw conclusions on the problem studied consistently and reasonably;
12) The availability of skills for independent replenishment of one's own knowledge in the specialty;

IV block:

13) The presence of motivation for self-development and improving skills in the context of expanding cognitive capacities;
14) Development of intellectual and cognitive qualities of the future professional (development of personal qualities and skills: sense of initiative, creativity, independence, self-confidence, etc.);
15) The presence of the ability to creative self-realization according to the individual capabilities of a person;
16) The ability to set a goal and find ways to achieve it.

Thus, these indicators revealing the range of success of the development of intellectual abilities of students are distributed to the following levels of cognitive capacities:

The elementary level: a student's pour knowledge and understanding of the theoretical content of the course; the lack of formation of some practical skills in the application of knowledge in specific learning situations, hence the low quality of the performance of study assignments; low level of motivation to increase own cognitive capacities;

The standard level: full knowledge and understanding of the theoretical content of the course; insufficient formation of some practical skills in applying knowledge in specific situations; sufficiently high quality of performance of all the study assignments provided by the training program; average level of motivation to increase own cognitive capacities;

The reference level: full knowledge and understanding of the theoretical content of the course; the formation of the necessary practical skills in applying knowledge in research activities; high quality of all the training assignments provided by the training program; high level of motivation to increase own cognitive capacities.

Thus, the levels of development of students' cognitive capacities demonstrate the student's ability to actualize in the process of intellectual activity his knowledge, communication, relationship and the properties of the studied aspects of cognition. So the student achieves a qualitatively new result rising to a higher stage of cognition, which is typical for the developing cognitive capacities of the young person and the cognitive process as a whole.

The procedure and results of the experiment

By organizing the cognitive process of students in the course of the experimental work in the direction of its correspondence to the tasks of developing cognitive potential, taking into account its actualization in the future profession, we sought to implement the most effective transformations. As the study showed, it is possible to evaluate the effectiveness of the development of students' cognitive capacities only through diagnostic procedures. In this connection, we used operational diagnostics - polls, interviews, questioning of students. It should be noted that the diagnostic stage during the experiment was of particular importance, since it helped to identify the actual level of components of development of cognitive capacities among students. We proceeded from the assumption that a graduate of a university must also have, in addition to high intellectual development, a professional orientation formed on the basis of a stable attitude toward the future profession. At the same time, the development of cognitive capacities also implies the manifestation of social activity of young people, for example, in the pursuit of the realization of their developed personal abilities. So at the diagnostic stage there was the following: Students developed ideas about cognitive potential as a possible strategy for professional growth; Development of intellectual and cognitive qualities in them and increase of motivation to self-actualization of their cognitive capacities. In this regard, we were guided by the following most important criteria for the development of students' cognitive capacities: The student's mastery of ways of activity and self-expression aimed at developing his consciousness and active intellectual activity; Readiness for practical realization of his knowledge; The impulse to fill the knowledge deficit with knowledge; Finding ways to achieve a specific result, predetermined by the scientific task; The need for cognition, self-development, self-affirmation, self-determination, self-actualization and professional self-improvement. As a diagnostic technique we used the idea of the Personal Orientation Inventory (Shostrom, 1964), which allows us to identify the dynamics of the development of students' cognitive capacities in the pedagogical practice of the university. Testing of the degree of cognitive capacities among future specialists was carried out in 2015-2016 academic year: initially - in September 2015, again - in May 2016 in one experimental and one control group. The experimental group consisted of 24 students of the 3rd year of the Physics Institute of the KFU in the specialty "Pedagogical Skills", the control group included 26 students of the 2nd year of the Physics Institute of the KFU, specializing in "Theory and Technologies of Education". The results of the diagnosis are shown in Table 1.

Table 1: The development of students' cognitive capacities

Components of the development of students' cognitive capacities	The control group	The experimental group

Formation of ideas about cognitive capacities as a possible strategy for professional growth	+ 2,5 %	+ 35 %
Possession of thinking culture; Ability to analyze and generalize	- 1 %	+ 15 %
Ability to draw conclusions on the problem under study	- 1 %	+ 17 %
Ability to set a goal and choose the best ways to achieve it	- 2 %	+ 35 %
Development of intellectual and cognitive qualities	+ 11 %	+ 48 %
The level of motivation to self-development and improving the skills	- 3 %	+ 30 %
The desire to self-actualize one's own cognitive potential	- 4 %	+ 25 %

Compared with the results of the control group we observe a steady growth in all factors in the experimental group. Thus, according to the results of the diagnosis we observe that the dynamics of the development of University students' cognitive capacities who took part in the experiment is higher than the similar dynamics of the control group. This, in our opinion, quite convincingly testifies to the effectiveness of the transformations of the educational process carried out by us in the course of the experimental work in the conditions of the university. Dynamics of indicators of students' cognitive capacities included in the main components of cognition also indicates that most students have increased the dynamics of the intellectual section of this potential (knowledge, skills and beliefs, a high degree of development of thinking, the ability to quickly change the methods of action in accordance with new conditions, etc.). At the same time, there were decreased the number of students with a narrow range of theoretical knowledge and weak practical experience in a certain field of activity. All of the above allows us to state that the research carried out confirmed the main provisions of the hypothesis. However, this does not solve all the issues related to the study of psychological and pedagogical conditions for the effective development of student cognitive capacities. It seems to us that the special research is required the following: To develop the ability of students to self-actualize their cognitive capacities in the process of studying profile disciplines; To provide pedagogical support of students in the development of their cognitive capacities; To provide opportunities to out-of-class work (in the field of research, scientific activity) for students with the aim of developing their potential for any kind of mental activity.

Discussions

Modern methods of strategic development of students' cognitive capacities are aimed at identifying the system of determinants of the intellectual potential of young people. Among them are the following: *Macrosocial factors*: they are represented by all kinds of social connections and student relations; *Institutional factors*: as a rule, they include a specially organized environment of this institution; *Personal factors*: they reflect personal qualities that characterize the social orientation of the intellect to a certain profession, the corresponding behavioral vector and life position. At the same time, the development of students' cognitive capacities is a combination of such components as innate and acquired qualities (physical, psychological, mental, social, etc.) in their integrity, diversity and interdependence. As the study showed, among the most significant factors in the development of students' cognitive potential there are such internal factors that are a system of certain conscious motivations (for example, interests, needs, aspirations, views, etc.). The very problem of developing the intellectual potential and cognitive activity of students in the conditions of the university is usually determined by the regularity of vocational training. In this regard, the preparation for the profession based on the development of students' cognitive capacities suggests the following: The creation of favorable conditions for the wider application of modern educational technologies and foreign experience in the organization of the educational process in the educational process; Increased opportunities for obtaining interdisciplinary

education; Training based on continuity, variability and continuity; Training in a university with an individual vocational training; Simplification of organizational support for the transition to individual forms of training; Expansion of academic mobility and increased opportunities for attracting foreign specialists to the university; Increase of efficiency and validity of control of students' training and their intermediate certification. On this basis, it is necessary to expand the development of the following main sections of the cognitive potential of university students: The value section (higher needs in cognition, self-development, self-affirmation, self-determination, self-actualization, professional self-improvement, etc.); The intellectual section (the system of knowledge, skills and beliefs available to the student on the basis of which his activities are built and regulated; a developed sense of the new; an openness to everything new; a high degree of development of thinking; the ability to quickly change the methods of action in accordance with new conditions, etc.); The activity section (the motivation to fill the knowledge deficit with action; the choice of the algorithm of research behavior; the technical readiness for intellectual activity; the ways of achieving a concrete result predetermined by the scientific task; the independent search for rational methods of teaching, etc.).

Conclusion

Based on the present study, we came to the conclusion that the theoretical basis for the development of students' cognitive capacities should be considered as the general problem field of humanitarian, special and profiled disciplines; as expansion of the scope of interaction with the intellectual potential of the university and forms of extracurricular activities; as monitoring of individual and group achievements of students; as implementation of information, interactive, presentation, social and affective functions of the educational process. All this should be actualized through the cognitive environment which includes the university educational system; innovative educational technologies; means of communication for the subjects of the educational environment. In this regard, the technological mechanism for managing the development of University students' cognitive capacities should be an orderly system of organizational and managerial actions aimed at shaping the intellectual development environment of the university, the indicators of which are the following: Clearly expressed in all elements the educational and scientific-research process; Orientation to the intellectually developed person; The formulation by the relevant institutions of the university of promising tasks for the long-term development of the intellectual potential of teachers and students; Expansion of scientific traditions and scientific schools; Cultivation of students' personal need for self-actualization of their knowledge, skills, subjective feelings of freedom and self-expression; Optimization of the development of cognitive potential of students within the framework of innovative learning conditions; Improvement of program and methodical support of the educational and cognitive process; Formation of students' motivation to acquire skills of intellectual work; Ensuring the continuity of the learning process with research work; Raising the level of qualification of the teaching staff; Material stimulation of intellectual activity of students and teachers.

In this regard, the factual data revealed in the course of the study make it possible to give a number of recommendations for the development of University students' cognitive capacities in conditions of vocational training: 1) The relevance of the content of university education to current and predicted trends in the development of the sciences; 2) The orientation of higher education on the development of the personality of the future specialist; 3) The conformity of the content of education and training to the goals of training the future specialist; 4) The activity approach to determining the content of training; 5) Rational application of modern methods and means of training the future specialist at all stages of his preparation; 6) The optimal combination of general, group and individual forms of organization of the educational process in the university; Taking into account the regularities of professional formation and development of the individual in the field of education and training.

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