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Future Teachers' Intellectual and Creative Skills Development in the Multicultural Educational Sphere

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Abstract

The relevance of the present issue is caused by a strong need of higher education practice in scientific and methodological provision of a future teacher's intellectual and creative skills development in the multicultural educational sphere. The aim of the article is to justify scientifically the procedural essence of pedagogical technology of learners' skills development in a higher pedagogical school. The main method of the research is conceptual and terminological analysis, as it helps to define key terms "intellectual and creative skills" and "system and prognostic thinking". On this basis the author reveals the essence of future teacher's intellectual and creative skills development, presents a pedagogical technology including theoretical, empirical and reflexive phases which are carried out through the mechanisms of goal-setting, practical exercising and reflection. The author works out motivation and cognitive, activity and reflexive criteria and indicators which are objective, universal and sufficient for correct fixation of qualitative changes in the level of future teachers' intellectual and creative skills development. The technology created by the author helps future teachers create and carry out new ways of influence on their pupils, perceive the educational process as a dynamic sphere of open tasks. The research materials can be used during future teachers' studying in a higher pedagogical school and advanced training.

Key words: intellectual and creative skills, system and prognostic thinking, technology of working on a pedagogical problem, higher pedagogical school.

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Introduction

1.1 The relevance of the problem

Under conditions when different segments of social and economic activities are widely covered with scientific and technological innovations new purposes in the strategies of contemporary education are predicted. Their essence is scientific search and foundation of alternative educational technologies, multipolar educational systems created in the context of Culture and Education, statement of the idea of long-life process of professional training and future teacher's intellectual and creative skills development in the multicultural educational sphere.

Despite positive changes in this direction, the prevalence of reproductive elements in the educational process is observed. However, it does not focus on creating real conditions for learners of a higher pedagogical school to master new ways of activity and thinking models. A set of methods and means does not meet the contemporary requirements and needs revising. The contradiction between realizing of the higher education practical need in scientific and methodological foundation of future teachers' intellectual and creative skills development and insufficient foundation of its procedural essence in the multicultural educational sphere is not solved.

1.2 Literature review

According to the great Russian engineer, physician and philosopher Kapitsa, intellectual and creative skills development is based on independent thinking formation. The evolution of theoretical and methodological aspect of the problem makes it obviously clear that intellectual activity of a person contributes to creation of new ideas and acts as a considerable advantage in the competitive high-tech world.

A great number of works of Russian and foreign psychologists and educators are dedicated to the problem of students' intellectual and creative skills development. The main idea of our research is that thinking, activity and creative skills are deeply interconnected. The statement is scientifically justified by Andreyev (2000), Arieti (1976), De Bono (1991), Brushlinskyi (1996), Guilford (1967), Rubinshtein (1958), Torrance, (1998), Shadrikov (2010) and others.

Methods and technologies of learners' intellectual and creative activity organization are described by Altshuller (1979), Ibatova & Ilin (2017), Khairullina et al. (2017), Terekhova & Nesterenko (2015), Volynkina (2012, 2014) etc.

In their research Glaveanu (2018), Guslyakova & Guslyakova (2017), Kudryavtsev (1990), Matyushkin (2017), Mahmutov (1975), Zhakupova et al. (2017) note that active cognition and learners' independent thinking development are possible under condition of thinking creativity "initiation".

Studying the problem of future teachers' intellectual and creative skills development in the multicultural educational sphere, we agree with Flores, the President of International Study Association on Teachers and Teaching, who states that the basis of teachers' professional training includes motivation, resilience, innovation and competence. From our point of view these components make up the term "educator's proficiency" which is in its turn synthesis of creativity knowledge and practical skills, and it is carried out through creative activity.

Within the problem under study it is useful to focus on the research of Kuzmina (1985) who considers that the essence of an educator's creativity is to implement new ways of influence on learners. The same point of view is shared by Kan-Kalik and Nikandrov (1990), Potashnik (2006) and others who consider the important role of creativity in educational process and the objective professional need in an educator's activity. The specific nature of a teaching profession lies in the necessity of creative interaction,

transformation and co-creation since a transformed personality of both a teacher and a learner by his/her nature is unique.

Developing different levels of an educator's creative activity, Zagvyazinskiy and Strokova (2011) believe that the highest level of pedagogical creativity is to create innovative highly efficient educational technologies revealing the essence and specific nature of educational process. Within our research it is useful to focus on the essence and specific nature of a future teacher's intellectual and creative skills development in the multicultural educational sphere.

Methods

The purpose of the research

The purpose of the research is to justify scientifically and reveal the essence of a future teacher's intellectual and creative skills development in the multicultural educational sphere.

Methods of the research

In the research the following methods were used: conceptual and terminological analysis, ascertaining and formative experiments, pedagogical observation, a diagnostic interview, ranking, an expert evaluation method, self-estimation, comparative characteristics, qualitative and quantitative comparison, and mathematical statistics.

Experimental base of the research

The experimental base of the research was Voronezh State Pedagogical University.

Phases of the experiment

The research included several stages.

The first stage dealt with studying contemporary state of the problem in the education theory and practice on the basis of scientific pedagogical and psychological literature analysis, defining the relevance, setting a goal, choosing methods and an experimental base of the research.

The second stage focused on conducting ascertaining and formative experiments, studying peculiarities of a future teacher's intellectual and creative skills development, carrying out the analysis, making a summary of the practical results.

The aim of the third stage was to conduct the result processing through mathematical statistics, making conclusions about achieving the goal and problem solving, issuing research materials.

Results

On the basis of theoretical and methodological analysis of different conceptions and approaches to the problem investigated in Russian and world science the following conclusions are made. Intellectual and creative skills are considered to be individual psychological peculiarities that allow solving the problem, the outcome of which in the context of world cognition serves as a basis of system and prognostic thinking development.

System and prognostic thinking is a type of thinking which integrates different conceptions and methods during sophisticated strategic activity and is based upon the synthesis of all components of the system of interconnections of the problem solved and prediction of consequences in future providing innovations and breakthrough to new opportunities.

This type of thinking involves understanding the essence of contradictions in the problem and predicting the principle directions of effective solving; finding out hidden resources and setting up reason and consequence connections when lacking knowledge but possessing formal logics; studying an object in

different models.

The ability to analyze multiplicity and interconnections of relations within the problem, to employ terms from other fields of knowledge when solving the problem and synthesizing them into the solution which has never existed before, to establish associative knowledge and to generate different options of the problem solving are integral components of system and prognostic thinking. Working with a piece of information it is necessary to be able to “compress” it while having scientific debate and reasoning skills.

The essence of future teachers’ intellectual and creative skills development is system and prognostic thinking acquirement through solving the pedagogical problem technology. This technology is presented in the form of some statements and based on the principles of “the contradiction language” implementation during classes, solving both single and group problems, finding out and synthesizing problem tasks, teacher’s support of adequate learners’ reaction to the problem.

It should be noted that the features of system and prognostic thinking formation as a basis of future teachers’ intellectual and creative skills development in a higher pedagogical school is not a one-phase phenomenon. Technologically, step by step it gradually evolves during the whole educational process and continues during a future teacher’s professional activity.

Intellectual and creative skills development creates an upward spiral effect covering theoretical, empirical and reflexive stages which are carried out through the mechanisms of goal-setting, practical exercising and reflection.

The phases of the pedagogical technology implementation

The theoretical and methodological conclusions serve as a basis of the experimental work consisting of ascertaining, formative and control phases.

During the experiment a set of tasks was determined:

- 1) to choose an experimental and control group for conducting an experiment;
- 2) to choose diagnostic tools for monitoring the level of higher pedagogical school students’ intellectual and creative skills development;
- 3) to implement the pedagogical technology consisting of theoretical, empirical and reflexive stages of experimental group students’ intellectual and creative skills development;
- 4) after finishing the pedagogical work to conduct the second monitoring of the level of skills development using the same diagnostic tools which were employed during the ascertaining phase;
- 5) to conduct a comparative analysis of the data before and after the formative experiment, to make final conclusions.

The ascertaining phase

The research involved 110 students of a higher pedagogical school. The experimental group was included 56 students. The control group consisted of 54 students. After organizational procedures were conducted, the ascertaining phase of the pedagogical experiment was carried out.

To monitor the level of the students’ intellectual and creative skills development, the diagnostic tools were chosen. They allowed defining the development level according to motivation and cognitive, activity and reflexive criteria of pre- and post-experiment. These criteria were objective, universal and sufficient for correct fixation of qualitative changes in the level of future teachers’ intellectual and creative skills development.

The indicators of the motivation and cognitive criterion were: sensitivity to creative problems and interest to solve them; readiness to develop his/her intellectual and creative capabilities, awareness of

creative problems solution tools in the professional pedagogical sphere.

The activity criterion was presented by such indicators as: scientific research planning and building algorithmic actions to reach the goal; search, analysis and information constructing; “compressing” the information, analyzing any system or object through “multiple screens” in the Past, the Present and the Future; solving any creative professional problem effectively during pedagogical practice; transferring the skills into a new situation; defending new ideas at public speaking.

The indicators of the reflexive criterion dealt with ability to carry out self-control and self-evaluation of intellectual and creative capabilities development; to forecast the further strategy development in the professional pedagogical sphere.

The level of intellectual and creative skills development was evaluated: with the help of Tunik and Tryakina’s questionnaires and creativity tests; the author’s theoretical and empirical tasks and experts’ evaluation; Vishnyakova’s creativity test and Karpov’s questionnaire.

The diagnostic monitoring at the ascertaining phase showed that the level of learners’ intellectual and creative skills development in the control and experimental group was approximately the same. According to the Pearson criterion χ^2 the statistical relevance of the data was 0.105 (Fig. 1).

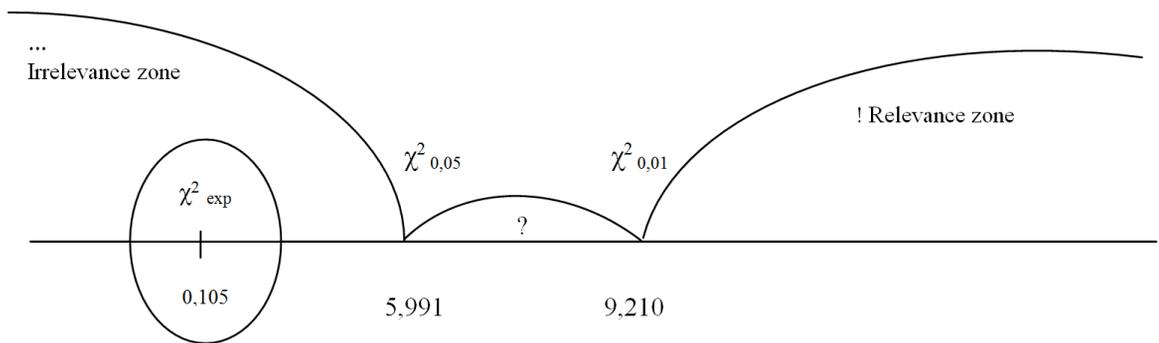


Fig. 1. The Pearson criterion χ^2 on the “axis of relevance” at the ascertaining phase

The formative phase

At the formative phase of the experiment the author’s pedagogical technology was carried out. It included theoretical, empirical and reflexive stages. Progression through the technology intensified the process of future teachers’ intellectual and creative skills development and focused on the process of creative self-development and self-improvement as the highest form of the person’s creative potential expression in the multicultural educational sphere.

The theoretical stage of the pedagogical technology consisted of the following steps.

1. Studying the main tenets of effective theories of intellectual and creative capabilities development; making students confident of becoming creative teachers who are able to create new ways of influence on learners if mastering the definite skills and special techniques.
2. Analyzing the trial-and-error approach, revealing the disadvantages of sporadic, non-dialectical thinking; studying the main terms, rules and techniques of intellectual and creative skills development through interactive video discussions, mastering skills of tools employment in the pedagogical work.

The empirical stage included practical problems solution which future teachers faced during their pedagogical training, conducting scientific research within students' scientific association, writing and defending the qualification paper. The students learnt how to solve a pedagogical contradiction according to a definite algorithm.

It was found that working on the problem such creative personal qualities as 1) ability to carry out his/her talents creatively; 2) ability to adjust to rapidly changing environment; 3) ability to solve professional problems successively under condition of time pressure; 4) ability to implement self-education and self-improvement through the latest ICTs mastering and creating a new intellectual product.

The reflexive stage dealt with effectiveness evaluation of intellectual and creative personal experience as a meaningful one. At this stage presentations and debates concerning creative pedagogical activities were conducted at students' scientific conferences.

Thus, in the formative experiment focused on intellectual and creative skills development in the multicultural educational sphere, creative projects, TRIZ methods, morphological analysis, "brainstorming", reflexive portfolio were used. Interactive "workshops" at practical lessons, problem lectures and seminars, "round tables", scientific conferences, international student forums, interactive professional games were carried out in the system and prognostic thinking development technology. Bibliographic literature about great inventors and educators and mass media were the effective means of intellectual and creative skill development in the multicultural educational sphere.

The creative tasks in the experiment group focused on the following skills development: a) building the strategy and algorithmic actions to reach the goal; b) "compressing" and "decompressing" the information; c) analyzing any system or object through "multiple screens" in the Past, the Present and the Future; d) solving any creative professional problem effectively through TRIZ methods, "brainstorming", the focal objects method etc.; e) transferring the skills into a new pedagogical situation.

The control phase

After the purposeful pedagogical activity concerning a future teacher's intellectual and creative skills development the Pearson criterion χ^2 was 32.130 (Fig. 2).

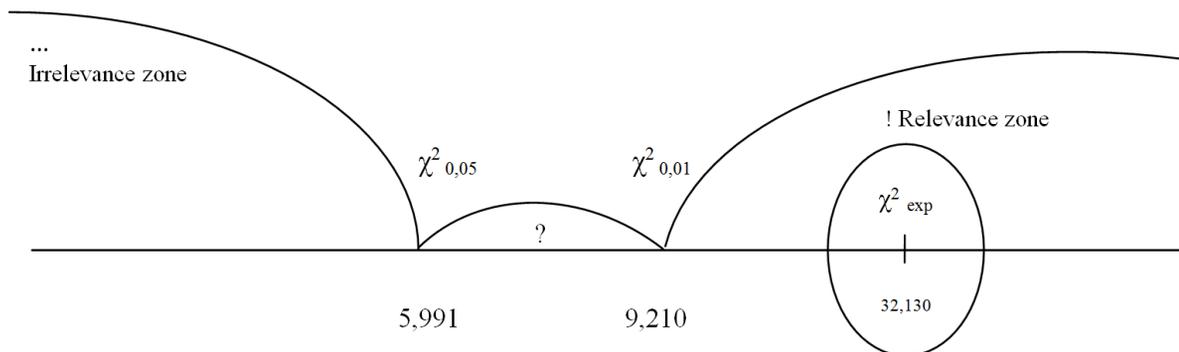


Fig. 2. The Pearson criterion χ^2 on the "axis of relevance" after the experiment

During the experiment the data of post-experimental testing (according to the Pearson criterion χ^2) showed that the results of the experimental group were different from the results of control group

($0.3358 > 0.1896$, $R_{exp} > R_{contr}$). Thus, the difference and quantity advantage of experimental group results were proved.

The pedagogical technology implementation of learners' intellectual and creative capabilities development in the educational process of higher pedagogical school gave a significant result: the number of students with a high and average level of intellectual and creative capabilities development was increased (57.7% and 76.7% comparing with the traditional approach); the number of students with a low level was decreased (37.9%) (Fig. 3).

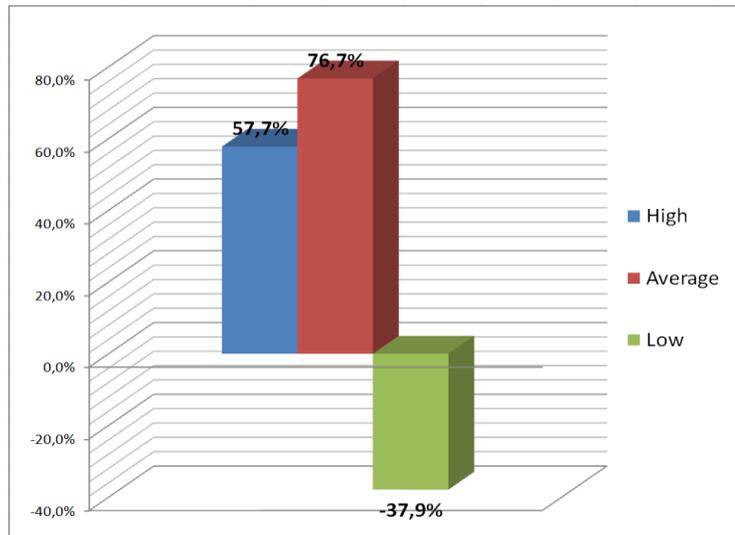


Fig. 3. The implementation result of the pedagogical technology of future teachers' intellectual and creative skills development

As a result of the technology implementation the level of future teachers' intellectual and creative skills development went up to 75.4 % comparing with the level before the experiment and the traditional approach (77.1%). Thus, it was proved mathematically that the author's pedagogical technology significantly increases the level of future teachers' intellectual and creative skills development in the multicultural educational sphere.

Discussion

The content analysis of psychological and pedagogical literature show that there is a great number of general theoretical statements about pedagogical creativity and insufficient development and systematic application of detailed technologies, mechanisms, effective methods of future teachers' intellectual and creative capabilities development in the professional pedagogical practice.

The problem is that future teachers' intellectual and creative skills development is connected with system and prognostic thinking development which is characterized first of all by dialectically implemented in the process of dealing with a problem according to an algorithm.

Unfortunately, the role of algorithms evaluation in a creative process is considered to be controversial. However, studying the views of scientists who argue for the principle role of "insight" or a flash of inspiration and views of researchers who recognize algorithmic methods of creative processes

(Altshuller, 1979; Kedrov, 1987; Yaroshevskiy & Petrovskiy, 1988) suggests that these viewpoints do not contradict but complement each other, reduce the distance to the real meaning of creativity nature and intellectual and creative skills development.

In our opinion, methodological procedure of “talented thinking” does not mean “the only correct” way but a system of rules of creative work with knowledge about a pedagogical problem. In this case future teacher’s individual approach to solving a professional problem is formed.

With this approach an educator during his/her professional pedagogical activity acts as “a trigger” which activates and guides the pupils’ self-deployment process. Competently developing the learners’ intellectual and creative skills, the educator succeeds not only in his/her learners’ new knowledge acquisition, but he himself / she herself enriches his /her intellectual and creative potential due to intensive co-working. In this case a very important process of “reverse information flow” is carried out; the results of the creative co-operation enrich the educator’s knowledge and professional advancement.

Thus, in the contemporary educational process the principle “Docendo discimus” (“Teaching the pupils, teaching ourselves”) should be carried out. The teacher stops being a knowledge translator, his/her function is of a new feature, i.e. to contribute to innovating the knowledge skills of young people, developing their intellectual and creative skills and implementing them in the professional pedagogical practice.

Conclusion

It was found that future teachers’ intellectual and creative skills development in the multicultural educational sphere will be effective if a) the pedagogical process focuses on the system and prognostic thinking acquirement as a basis of future teachers’ intellectual and creative skills development through solving the pedagogical problem technology; b) in the educational process of a higher school the pedagogical technology is carried out which includes theoretical, empirical and reflexive phases; the transition between them are marked by specially developed criteria and their indicators which reveal the content of the phases and principle mechanisms of intellectual and creative capabilities development at each phase.

Understanding the nature of intellectual and creative capabilities development presented in the author’s pedagogical technology facilitates future teachers to create and implement new ways of influence on the pupils and perceive the educational process as a dynamic sphere of open tasks.

References

- Altshuller, G. S. (1979). *Creativity as an exact science: the Theory of inventive problem solving*. Moscow: Sovetskoye Radio.
- Andreyev, V. I. (2000). *Pedagogy: studying course for creative self-development*. Kazan: Centre of Innovative Technologies.
- Arieti, S. (1976). *Creativity - the magic synthesis*. New York, NY: Basic Books.
- Barron, F. (1963). *Creativity and psychological health*. Princeton, NJ: Van Nostrand.
- DeBono, E. (1991). *The 5-day Course in Thinking*. Penguin Books.
- Brushlinsky, A. V. (1996). *Subject, thinking, studying, imagination*. Moscow: Institut prakticheskoi psihologii.
- Duncker, K. (1935). *About the psychology of productive thinking*. Berlin: Springer.
- Glaveanu, V. P. (2018). Educating which creativity? *Thinking Skills and Creativity*, 27, 25-32.

- Guilford, J. P. (1967). *The nature of human intelligence*. New York, NY: McGrawhill.
- Guslyakova, N., & Guslyakova, A. (2017). The role of pedagogical reflection in the process of university students' professional training. *ICERI2017 Proceedings: 10th annual International Conference of Education, Research and Innovation*. Seville, Spain: The International Academy of Technology, Education and Development (IATED), 8716–8722.
- Ibatova, A. Z., & Ilin, A. G. (2017). Creativity in education: The philosophical aspect. *RevistaEspacios*, 38(55). Retrieved from: <http://www.revistaespacios.com/a17v38n55/a17v38n55p33.pdf>
- Kan-Kalik, V. A., & Nikandrov, N. D. (1990). *Pedagogical creativity*. Moscow: Pedagogika.
- Khairullina, N. G., Garabagiu, V. A., Filippova, I. A., Ryabova, Yu. S., Abramova, S.V., & Omelaenko, N. V. (2017). Research of creative activity among students of Tyumen's universities. *Revista Espacios*, 38 (25). Retrieved from: <http://revistaespacios.com/a17v38n25/in173825.html>
- Kedrov, B. M. (1987). *About creativity in science and engineering*. Moscow: Molodaya gvardiya.
- Kudryavtsev, T. V. (1990). The creative nature of a person. *Psychology Issues*, 3, 113-120.
- Kuzmina, N. V. (1985). *Capabilities, giftedness, talent of a teacher*. Leningrad: Znaniye.
- Mahmutov, M. I. (1975). *The problem teaching: the basic questions of a theory*. Moscow: Pedagogika.
- Matyushkin, A. M. (2017). *The psychology of thinking. Thinking as problem situations solving*. Moscow: Pedagogika.
- Potashnik, M. M. (2006). *Education quality: problems of management technology*. Moscow: Pedagogicheskoe obschestvo Rossii.
- Rubinshtein, S. L. (1958). *About thinking and ways of its research*. Moscow: AN SSSR.
- Shadrikov, V. D. (2010). *Professional capabilities*. Moscow: Universitetskaya kniga.
- Terekhova, G. V., & Nesterenko, A. A. (2015). Development of TRIZ-based education in Russia. *European Social Science Journal*, 1(1), 115-120.
- Torrance, E. P. (1998). *The nature of creativity as main test in its testing*. New York, NY: Cambridge University Press.
- Volynkina, N. V. (2014). *Intellectual and creative capabilities: the infolinguistic path of development*. Voronezh: CPI Scientific Book.
- Volynkina, N. V. (2014). Intellectual and creative potential of a person as a stabilizing factor in the development of modern Russia. *Vocational education in the modern world*, 3(14), 96-102.
- Volynkina, N. V. (2014) Multicultural sphere of high school as a basis of improving of the system of the studying youth intellectual and creative capabilities development. *Perspectives of science*, 2(53),171 -173.
- Volynkina, N. V. (2012). *The Infolinguistic system of the studying youth intellectual and creative capabilities development in institutions of higher education*. PhD Thesis, Yeletz.
- Yaroshevskiy, M. G., & Petrovskiy, A. V. (1998). *The fundamentals of theoretical psychology*. Moscow: Infra-M.
- Zagvyazinskiy, V. I., & Strokova, T. A. (2011). *Pedagogical innovation: the problems of strategy and tactics*. Tymen: Publ. House of TSU.
- Zelts, O. (2008). *The laws of productive and reproductive spiritual activity*. Moscow: Astrel.
- Zhakupova, Ya.T., Dolgova, V. I., Kryzhanovskaya, N. V., Kondratieva, O. A., & Kapitanets, E. G. (2017). Gifted adolescents: Special qualities of the cognitive activities' motivational component. *Revista Espacios*, 38 (40). Retrieved from:

<http://www.revistaespacios.com/a17v38n40/a17v38n40p22.pdf>