

Creativity of High School Teachers Over Time

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Abstract: This article deals with the creativity of teachers of higher education in the process of their professional activity. The teacher's creativity is substantiated as an important factor that determines the success of the teacher's professional activity and, as a consequence, a better educational process. An active professional thesaurus of a teacher is considered as a means of supporting indicators of changes in biological creativity. The data were obtained from direct surveys of teachers, administrators and managers of universities, using D. Johnson's creativity questionnaire, adapted by E.V. Tunik, as well as from the review of the results of scientific and pedagogical activities of university teachers: original articles, creative classes, and translation of creative behavior. Based on the data of the study, the dependence of the level of creativity of a higher education teacher on the level of a professional thesaurus is revealed. In particular, the article presents the level of creativity of teachers who combine educational work with research, teachers who are mainly engaged in educational activities and representatives of the administrative and managerial personnel of universities, combining managerial functions with teaching.

Keywords: High school teacher, creativity, biological creativity, active thesaurus, creative efficiency.

INTRODUCTION

The appeal to the problem of creativity of higher education teachers somehow involved in research activities is associated primarily with the ongoing qualitative changes in the higher education system of Russia and arising in connection with this contradiction. One of which is that there is a need for creative solutions and development aimed at developing students' creativity, educational programs and classes (Setiasih *et al.* 2020).

The ongoing changes are primarily due to global trends, such as globalization, integration, democratization, informatization, the technological development of education, the development of creative economies and creative classes (Florida, 2010). In addition, Russian higher education is passing through processes called diversification, regionalization, stratification, commercialization, competence and, most importantly, standardization, which, together with the

Federal State Educational Standards, presents the higher education system with the requirement to prepare creative specialists (Kharchenko, 2014; Aibatirov and Kharchenko, 2016).

The ongoing processes are changing the requirements for the professional and personal competencies of a university teacher. Willingness to transforming activities requires increasing participation in these processes of the teacher himself, in his/her search for new professional knowledge and ways of processing it, his/her openness to new knowledge and values, as well as the ability to timely correct his/her conceptual framework for understanding professional reality and its objects. In other words, a modern Russian university needs a creative teacher (Widana, Sumandya, Sukendra, & Sudiarsa, 2020).

In this regard, the focus of the research is the professional development of the university teacher, which is understood as the constant, throughout the entire period of the scientific and pedagogical activity, qualitative self-transformation of teacher's inner world, leading to a fundamentally new structure and way of life - creative self-fulfillment in the profession (Petrova,

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Mareev, Pivnenko *et al.*, 2016; Pergun, Kharchenko, 2018; Borlakova, Klushina, Klushina *et al.*, 2018).

Analysis of research data shows that a creative teacher, his/her stable professional orientation, motivates students to form creative learning behavior and determine the success of the educational process (Aleinikov, 1990; Aibaturov and Kharchenko, 2014; Borlakova *et al.* 2018).

In this case, an important condition for the formation of students' creativity is the teacher's demonstration of creative behavior, i.e. a creative teacher presenting before the university audience.

It should be noted that the role model is not a specific algorithm of actions and operations, but, first of all, the creative orientation of the teacher's personality, his/her professionally-oriented creative behavior.

The experience of mathematical modeling of the age changes in the creative resource of a specialist in general and a university teacher, in particular, is interesting in terms of this study. In this work, we used some of the results of the simplest mathematical modeling of the creative efficiency or creative productivity of a specialist obtained by domestic and foreign scientists (Bogomolova, 2008; Kruglov, 2002; Morozov, Chernilevskii, 2004; Stoch, 2020).

We should accentuate that creative efficiency is only one of the components of the spectrum of teacher characteristics. It comes to the fore among other equally valuable abilities when there is a need for the qualitative development of education, and, in the wake of it, the country's economy.

METHODS

The studies were carried out in several universities in the North Caucasus and Southern regions of Russia. To substantiate here the theoretical and applied provisions and the argumentation of the conclusions, we used systemic, comparative and factor analysis, as well as the method of descriptive statistics.

To obtain primary data and form the background knowledge on the problem under consideration, which formed the basis for the content of this article, the content analysis technique was used, which assumed the following actions:

- the study of scientific literature, regulatory documents governing the educational process in the system of higher education (Federal Law "On

Education in the Russian Federation", Federal State Educational Standards, the professional standard);

- direct surveys of teachers, administrators and managers of universities, using D. Johnson's creativity questionnaire, adapted by E.V. Tunik (Tunik, 1997);
- the review of the results of scientific and pedagogical activities of university teachers: original articles, creative classes, and translation of creative behavior;
- statistical processing of the results obtained from interviews with teachers and analysis of the results of scientific and pedagogical activities;
- selection and formation of the content of the article based on the results of the analysis of the literature and processing of the data obtained, discussion and agreement by the authors of the scientific text.

RESULTS

According to researchers (Berezina, 2008; Kharchenko, 2014; Aibaturov and Kharchenko, 2016), the mathematical model of changes in creativity over time is a superposition of two basic processes that determine the creative performance of a specialist, in our case, a university teacher: the first process is changes in objective abilities a person to processing (associative analysis, etc.) of accumulated and mastered information - an active thesaurus of a specialist.

This process is described in the model by a parameter called "biological creativity" - K . Analysis of scientific data has revealed the following dynamics of changes in human biological creativity in ontogenesis (Figure 1).

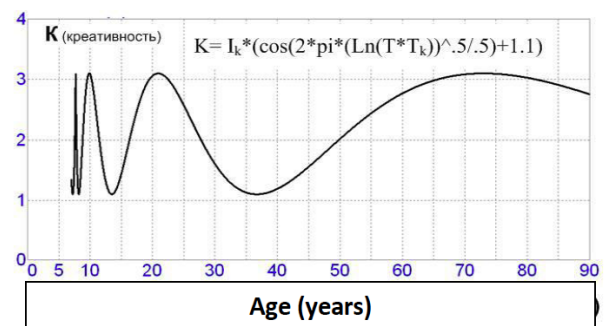


Figure 1: Dynamics of changes in human biological creativity.

The basis for such a statement may be:

- subjective experience of assessing the dynamics of creative opportunities, both their own and others'. For example, well-known figures of science and culture, distinguished by their creative abilities (Nikola Tesla, Wolfgang Pauli, Petr Kapitsa, Lev Landau, Anna Akhmatova, Lev Gumilyov, etc.) whose activities recorded periods of relative creative stagnation and uplift;
- the results of objective biochemical studies showing a significant increase in the level of certain substances in the human body that are directly responsible for the efficiency of information processing in the nervous system, such as myelin. The level of myelin in the nerve membranes of human is known to increase initially at the age of 5-7 years, then decline in the youthful period, and reach its maximum at the time of puberty (by 15-20 years). These data correlate with well-known experience in changing the creative abilities of children (Bogomolova, 2008);
- similar studies conducted on adults have shown that myelin levels in the nerve membranes increase after forty years, reaching its maximum by 60-70 years. Recent research by B. Stoch, University of California (Stoch, 2020) have shown that neurons do not die over the years, although the connections between them can be lost if a person does not use them, preferring not to strain the brain with mental activity. More importantly, the amount of myelin in the brain increases with age. It contributes to a faster passage of signals between neurons, which increases the overall intellectual power up to 3

thousand percent compared to the average. At the same time, the peak of myelin production activity occurs at the age of over 60 years.

The second process is the accumulation of special knowledge and professional development is described by a parameter called the "active thesaurus" of a teacher. One should probably distinguish between active thesaurus and awareness. An active thesaurus is precisely the aggregate information on the specialty and related problems, which is constantly realized and present in the teacher's mind when interpreting and constructing his/her processes of interest (one can compare it with the "random access memory" of a computer).

DISCUSSION

During the research, we surveyed teachers, administrators and managers of universities using the D. Johnson creativity questionnaire, adapted by E.V. Tunik and analyzed the results of their scientific and pedagogical activities.

As a result of the research work, 4 models of teachers with different levels of creativity were identified. We named them researcher-teacher (actively in research and educational activities), tutor-teacher (involved mainly in academic activities), administrator-teacher (combining educational and administrative activities at the faculty, directorate level) and manager-teacher (combining educational and management activities at the level of the directorate, pro-rector's office and rector).

The relationship of teachers' creative efficiency on the "active thesaurus" is shown in Figure 2.

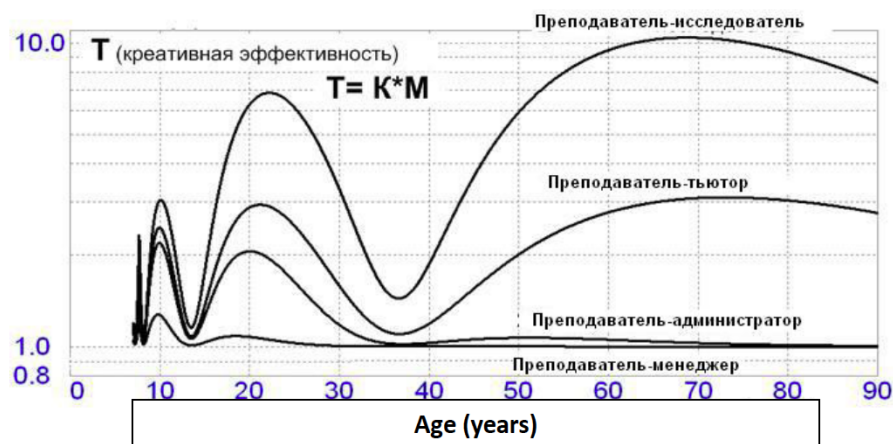


Figure 2: The relationship of teachers' creative efficiency on the "active thesaurus."

Figure 2 shows the relationship of creative effectiveness T on the age of teachers with approximately the same biological creativity K, but with different forms of active thesauruses M. That is, the creative effectiveness of people with equal giftedness, but with a different attitude to their profession and in different offices in the university was calculated. The analysis of the relationships shown in the figure reveals the importance of qualification or an active thesaurus for the teacher's creative efficiency.

The study showed that the level of creativity of a higher education teacher is maintained by a constantly developing professional thesaurus.

The highest level of creativity is observed among teachers who combine academic and research activities. The creativity of teachers who are mainly engaged in educational activities is somewhat lower. A low level of creativity was revealed among representatives of the administrative and managerial personnel of universities, combining managerial functions with teaching.

In the course of the study, problems and contradictions were identified that prevent from complete self-fulfillment of the teachers' creativity.

Some of the problems are persisting stereotypes in the work of university teachers that have developed in the outgoing system of Russian higher education, which levels out, suppresses, and, in fact, does not correspond in its content, forms and means, biological characteristics of the development of creativity, talent, and personal wit, both of a teacher and a student.

The persistence of these stereotypes in professional activity is due to the fact that the majority of teachers and university students in their creative activities use only one method - the trial-and-error method, better known as the "Monkey's method". The words expressed in the last century by V.A. Zvegintsev still hold sway: "surprisingly, the actual situation is such that, in terms of the technique of his/her intellectual activity, a modern man is at a level not much higher than that of a Neanderthal" (Zvegintsev, 2007).

This implies one of the conclusions that teaching culture and techniques of intellectual, creative work is the main task of higher education.

It was also revealed that ideas and methods of creative or projective pedagogy are being introduced extremely slowly into the higher education system

(Aibatyrov, Kharchenko, 2016; Aleinikov, 1990; Bos, 2008; Kharchenko, Panova, 2009), which allow not only to master and replicate knowledge, but to produce new knowledge, new technologies in the learning process, since the goal of creative or projective pedagogy is to transform any educational subject (course, program) into a creative educational process that would educate creative students - much more effective than those prepared by the traditional educational system (Aleinikov, 1990; Aibatyrov and Kharchenko, 2014).

CONCLUSION

A university system aimed at development needs a creative teacher because he/she works with a student, person, personality, individuality (Knowles, 1980; Kharchenko, 2014), who has creativity and eagers for its implementation.

An effective solution to the problem of developing creative abilities, both for university teachers and students, requires a significant transformation of the entire didactic system of higher education, the introduction of creative solutions into the scientific, methodological and informational support of the educational process.

In our opinion, such transformations should not be avoided, especially since they have always been and always will stay in the education system. The creative economy requires creative professionals who can only be trained by creative teachers.

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