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Education Reform at the Science University and the New Strategy for Training Science Teachers

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The urgency of the problem of designing a new strategy of teacher training due to the reform of education in universities: decrease of pedagogical disciplines, strengthening fundamental (subject) training, etc. The goal of the article lies in identification of the main components of the new strategy of teacher training. A leading approach to the study of this problem was personological. The result was a new model of teacher training. Undergraduate students are deepening their knowledge of the core subjects (be it Mathematics and Physics or Chemistry and Biology), while graduate students are making a choice: whether to be an engineer, researcher, scientist (which means keep deepening one's knowledge) or be a teacher (which means master psychology, pedagogics, and the methodology of teaching a chosen discipline). The new approach has helped identify the indicators and determinants of pedagogical craftsmanship. The results of the study can be useful in designing new strategies for training teachers

Keywords: education reform at the University, teacher training, personal developmental model, indicators of pedagogical skill of the teacher

INTRODUCTION

In the early 2000s already, there were adopted fundamental documents setting out the priorities and major objectives of state policy in the educational sphere (National Doctrine of Education in the Russian Federation through to 2025, Concept of Modernizing Russian Education for the Period through to 2010, Federal Target Education Development Program for 2006-2010, and Priority National Project "Education"). These documents set out the major focus areas of reforming the Russian system of higher education, the reforms aimed at preparing teachers of a new type.

However, there immediately emerged negative trends: science and education's

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being not accustomed to new – market – conditions became the primary reason behind a slowdown in the implementation of the reforms. This was pointed out by participants in the 42nd International Symposium on Engineering Education "Global Challenges in Engineering Education" (September 25-27, 2013, www.igip-online.net), the 16th International Conference on Interactive Collaborative Learning (September 23-28, 2013, www.icl-conference.org), the International Research-to-Practice Conference "Modern Issues in the Didactics of Secondary and Higher Professional School" (October 1-2, 2013), the 3rd International Research-to-Practice Conference "Early Childhood Care and Education" (November 21-23, 2013), and others.

The study: an analysis of documents and sociological surveys

The Concept of the Long-Term Social-Economic Development of the Russian Federation for the period through to 2020, which was worked out by the Government of the Russian Federation, stresses the need for creating and adopting a modern innovation model of education. This was also pointed out in the Concept of the Federal Target Program "Scientific and Pedagogical".

Human Resources of Innovation Russia for 2009-2013", which is aimed at creating conditions for the effective reproduction of scientific and scientific-pedagogical human resources, entrenching youth in the sphere of science, education, and high technology, and maintaining the continuity of generations.

Changes that took place over the period of educational reforms aggravated a number of issues associated with the adoption of new generation standards, a shift to a multi-level system, and a change in the conditions of the operation of colleges, which led to an increase in load on teaching staff. Note that, according to Yu.V. Sorokopud (Sorokopud, 2012), over 70% of college instructors have hard time working out and reworking academic complexes of disciplines based on the new generation Federal State Educational Standard of Higher Professional Education (FGOS VPO), 75% – putting into practice interactive forms of conducting classes, over 50% – using information technology, including the Internet, in the educational process. At the same time, the quality of professional preparation is in large part governed by the efficacy of the use of the resources of the educational environment in colleges by instructors.

The Russian system of education is known to aspire in the process of reformation to using the American educational model. Note that the Russian system of higher education has been borrowing both the structure of education and professional orientation titles (master, bachelor), as well as forms of education (distance learning instead of part-time), pedagogical technology, etc. The orientation towards the competence approach recommended by the Council of Europe has been realized in developing educational standards and pre-school, elementary, secondary, and higher education programs.

However, the penetration of market relations into the organizational mechanisms of education force Russian colleges to look for a new quality of offered educational services that would interest the modern consumer, which is possible on condition that the challenges of time are met and the prognostic approach in educational strategy is actualized (Matyushkina, 2013; Rostovtseva, 2005).

Diversification as a condition for preparing teachers in new conditions is a poly-functional phenomenon. It compensates for drawbacks objectively existing in the system of pedagogical education, complements and perfects it in the context of the principle of continuous education. Apart from the social-pedagogical and management functions, diversification also fulfills the function of forming corporate culture not only in colleges but in educational institutions for which it prepares bachelors and masters: diversification is aimed at forming the innovation potential

of the development of individuality as well as special competitive qualities of educational institutions (pre-school children's organizations, schools, gymnasiums, lyceums) in the market of educational services.

The paradigm of education is rapidly changing right before our eyes: the pedagogue is increasingly acquiring the qualities of not just an instructor/researcher, but those of a psychologist, engineer, or constructor.

However both in Russia and abroad, despite an evident shift in the paradigm of education, the personality of the learner is viewed not only from the standpoint of the "professiogram" as a certain model but from that of anthropocentrism as a person (in an increasingly more personified – personality- developing, subject-oriented, and individualized – form). This is why at Kazan State University they have developed a personified model for preparation of instructors – when at undergraduate level students deepen their knowledge of the core subjects (be it Mathematics and Physics or Chemistry and Biology) and at graduate level they make a choice: whether to be an engineer, researcher (which means keep deepening their knowledge) or be a teacher (which means master psychology, pedagogics, and the methodology of teaching a chosen discipline). The Institute of Psychology and Education at Kazan Federal University is the largest educational facility for preparing pedagogues and psychologists in the Volga Region; it has all the levels of higher education: undergraduate, graduate, post-graduate, and doctoral level studies, as well as a developed system of advanced training and retraining for educational workers. The mission of the Institute of Psychology and Education is the organizational- pedagogical, scientific, and methodological support of the development of higher professional, post-college, and additional education across areas, majors, and specialties relating to the sphere of pedagogics and psychology.

Currently, (both in Russia and abroad – in England and the US) humanitarian personology is viewed as a means of personifying predominantly higher professional education. Note that personification is construed not only as appealing to individuality but a form that helps see new reserves in the strategy of learning, which is aimed at actively engaging the learner not only in the processes of self-learning but those of self-actualization (Belyakova, 2009; Yesaulova, 2012; Korneyeva, 2004).

In the West, the issue of personification is currently viewed in the context of multi- cultural society and poly-cultural education. For instance, Christine E. Sleeter in her book, which is actively used in many European colleges as a learning guide, stresses: "Multicultural education is a relatively new field that has faced a constant struggle for legitimacy, even though the issues it addresses regarding human difference, social justice, and the form education should take in a pluralistic society are as old as the United States. Conservative educators criticize or dismiss multicultural education as radical and misdirected. Twenty years ago, Harry Broudy (1975) argued that the stress on cultural diversity is divisive and will lock out minority groups from the system by failing to teach them "to participate not only in the culture of this country but also in the intellectual and artistic achievements of the human race". Recently conservative critics such as E. D. Hirsch (1990) have put forth the same objections, claiming that in their attempts to teach children about diverse groups, schools have produced culturally illiterate Americans who have little sense of a shared culture. Such criticisms are hardly surprising: since multicultural education challenges conservative beliefs, one would not expect it to garner much conservative support» (Sleeter, 1996).

"Culturally illiterate Americans" the book's author is speaking of, are very much like culturally illiterate Russians, whose generation grew up already amid the "reformation" of school. The similarity between situations in different countries makes issues brought up in personology topical. Even more so that Russia is a multi-national state with complex interconfessional and intercultural relations. In terms of

personology, one can wonder why some are law-abiding citizens and others are inclined to deviant and marginal behavior, why "an attitude of care towards national culture" sometimes provokes nationalism, separatism, extremism, etc.

The term "personology" is known to have first appeared in the works of Henry Murray, a physician, Doctor of Philosophy in Biochemistry, psychoanalytic, explorer of the oeuvre of Melville, and long-time Director of the Harvard Psychological Clinic in the School of Arts and Sciences (Murray, 1938; 1943; 1994; 1951).

The emergence of the term was caused by the author's aspiration to accentuate the need for the integral study of personality, which, first, possesses not only a social but biological nature and, second, lives and develops within a certain environment and a certain socio-cultural context. Furthermore, Henry Murray's personology is more a theory of motivation than a theory of personality. In pathopsychology, he is the creator of the Thematic Apperception Test, which was widely used in the clinic and was later adapted by American psychologists D. McClelland and J. Atkinson to the study of man's primary motives as a whole (content- analysis): the need for success, power, and belonging (McClelland, 2003).

Henry Murray was among the first scholars to view motives as sustainable personal dispositions. However, that said, in his article "Toward a Classification of Interactions" (Murray, 1994) he concluded that goal-oriented behavior can be explained only as the result of the interaction of personal (the need state as the desired target state) and situational ("pressure" as symptoms of a situation, which one can hope for or which one should be apprehensive about) factors: "pressure" actualizes a corresponding need, while the need looks for a "pressure" that matches it; their crossing was denoted by Henry Murray as the "thema". Thanks to this approach, Henry Murray influenced modern interactionism. He developed a number of methodologies for the study of personal needs, including the Thematic Apperception Test (2003), which was based on his list of needs and presses, which earned him worldwide renown.

Transforming the ideas of personology into pedagogical forms of personification, V.A. Petrovsky notes (Petrovsky, 2007) that it is not a discovery today that the "psychology of personality" is not one psychology but two: fundamental psychology (also known as "academic") and practical psychology (the practice of psychological consulting). Each of the two occupies its own niche in the public consciousness and life of society. They differ in everything. Issues, approaches, credibility criteria, the categorical apparatus – all this is different. "Objectivity", "Truth", "Determinism", "Hypothesis", "Term operationalization", "Statistical methods", "Result interpretation", "Learning", and so on – such are the terms of fundamental science. "Subjectivity", "Freedom – Responsibility – Choice", "Psycho-technical myth", "Metaphor", "Uniqueness", "Understanding and acceptance", "Growth of the personality from the inside", and so on – this is how practical psychology "positions" itself. Psychologists/researchers and psychologists/practicians publish their works in different journals and have different reading audiences. In Russia, the differences cut across even the material well-being of those in each of the two camps (to be a successful practicing psychologist means to be able to make some a sort of a living, which partially explains the wave of retooling academic psychologists, who virtually have poured into practice).

Thus, "general personology", in terms of the conception of its design, is a psychological theory of personality, which acts from the side of the effects of its impact upon the personality; practical psychology as the applied psychology of personality. Theory and practice face to face. The context of the formation of new personology is made up of anthropology, social practice, and pedagogical anthropology (which connects the former with the latter). For the relations between objective reality, activity, culture, and personality are not that simple. Meaning is virtual by nature, reflects not the instantaneous but the relatively permanent

relation of a specific person towards the objective world – "relatively" because it is meaning that is the mechanism which but reflects and expresses the dynamics of change in this relation; it is that in the psyche of man which ensures the possibility of a "leap" in the relations between man and the world (Petrovsky, 2002). For meaning- making is a process of the creative mastering of ways of world-perception, world-relation, and culturological activity, which were created by man in the process of social development, by subjects of education (Petrovsky, 2007). However, in Russia there is still used for evaluating pedagogues a formalized list of competencies which includes competencies in goal-setting (material, personal); competencies which ensure bringing the personal meaning of learning to light; competencies in the learner's comprehension; competencies in decision making; competencies in ensuring the comprehension of academic problems and work methods; competencies in organizing learning activity; competencies in ensuring motivating behavior and learning activity; competencies in the subject taught and in methods; competencies in working out program activity; competencies in ensuring the information basis of activity. As we can see, in competencies there is not even a hint of the self-creating principle in subjects of the educational process – ones instruction is provided to (pupils or students) (The Theory and Practice of the Assessment of the Qualification Level of Pedagogical Human Resources in the System of General Education, 2013).

D.I. Feldstein stresses that while "changing and developing our society, we ought to come up with means of preparing pedagogues capable of directing their disciples towards socio-cultural changes, including changes in one's attitude towards oneself, others, as well as one's attitude towards acquiring knowledge. Research findings reveal that about 80% of senior high school students understand the need for acquiring knowledge. But this understanding does not grow into a need, for we do not know how to foster one's attitude towards knowledge as not just a way to acquire a specialty but as a self-forming principle" (Feldstein, 2011). It is just the "self-forming principle", or self-creating principle, that sets the personified approach apart from the person-developing, individual- differentiated, nature-aligned, etc., approaches.

Thus, in some cases, the personification of education is a tradition (a very conservative one at that, like, for instance, in England, the US, or France), in others it is an innovation that dispels entrenched stereotypes (both in Russia and the CIS states). At the moment, in the setting of the humanization and democratization of society, there are taking place processes of transforming and upgrading the system of higher education, whose major objective is the making of a personality with a high level of intellectual, moral, and cultural development. As is noted in the Federal State Educational Standard, graduates must have readiness for working with colleagues, the ability to come up with adequate organizational-managerial solutions in non-standard situations, the ability to take stock of one's virtues and drawbacks, chart ways of and choose means for developing one's virtues and getting rid of one's drawbacks, must possess a culture of thinking, the ability to set goals and come up with ways to achieve them, i.e. be a highly moral, socially mature, creatively active person with a developed potential of interaction, capable of self-actualization and getting connected at professional and personal level, which actualizes the use in the educational process of a new, productive, type of interaction between the instructor and the student, in realizing which there takes place not only the exchange of information, knowledge, and skills but personal emotional and communicative experience, settled views and assessments, and the student is a full participant in the well-organized educational process constructed inclusive of one's personal needs and motives of behavior.

The degree of personification (personal and professional self-development, self-creation) of the pedagogue and the disciple at schools of higher professional

learning is also influenced by economics, politics, and changing socio-cultural conditions.

A primary distinction of the world's leading universities from Russian ones is, on one hand, the former's attitude of care for their traditions, the conservatism of established models of learning and, on the other hand, academic freedom both for students and instructors, which helps personify the entire educational process. In the Russian system of higher education, traditions are being broken and economic innovations (normative per capita funding, teaching staff optimization, etc.) do not yet improve the efficacy of personified approaches many Russian colleges employ. Meanwhile, the West's leading universities are unremittingly developing their personified system of education, which is expressed, on one hand, in the theory of extreme individualization, in granting the student full freedom in choosing the content of education and methods for mastering it and, on the other, in focusing on students' divergent thinking, which enables them to realize the multi-variant approach to examining educational and creative issues.

The methodology of the experiment

During the course of experimental studies, we conducted over the period of 2012-2013 (Gabdulchakov, 2011a, 2011b, 2011c; Gabdulhakov, 2013a, 2013b, 2013c), we marked out the following indicators for the personification of academic communication in colleges:

- the personal indicator (the degree of self-actualization of the student's personality); the empathic indicator (the instructor's ability to put oneself in the student's shoes and look at the world from the student's eyes);
- the reflexive indicator (the emotional field of the class, the field of joy, surprise, admiration, and happiness); the cognitive indicator (taking account of the value system of the personality of the student and the instructor); the interactive indicator (the unity of the conscious and the unconscious);
- the nuclear indicator (the realization of the communicative nucleus in communication and academic-cognitive activity); the integrative indicator (the integrativeness of academic content); the nature- aligned indicator (taking account of the individual pace in the development of personality);
- the attractive indicator (the attractiveness of the content and form of the class); the result indicator (the practical orientation of the content of the class). These indicators were identified based on Spearman's correlation analysis and established the dependence of mechanisms of creative (personified) self-actualization of the personality of students on the instructor's creativeness (pedagogical craftsmanship).

The total sample of test subjects featured 2347 students of different specialties.

The results of the study

The indicators identified helped prove that the efficacy and prospective viability of personified education in Russia is determined by the following components:

- poly-paradigmal, if we view it as a research methodology which presupposes openness to various visions of the issue of forecasting and designing the future of the school of higher learning; providing a rationale for innovation strategies for the development of higher education in a conceptual synthesis of a set of existing educational paradigms; being oriented towards the practical result of applying transforming strategies and innovation technology to various types of pedagogical practices and various models of higher education; identifying the priorities of innovation strategies in forming a single educational space in the globalized world;

- noxological, which by all means must be taken into account in building personified education: this education must be not only safe but oriented towards the development of health protection and the formation of a culture of health;
- reflexive: the reflexive technology of organizing the professional-personal self-development of future pedagogues is a special organizational-pedagogical processual mechanism for realizing the interrelated reflexive stages in the enhancement of the instructor's professional activity: 1) reflexive-analytical (the diagnostic stage); 2) constructive-orientational (the instructional stage); 3) stabilization (criterial-evaluative stage); 4) systemic reflexion (the prospective-design stage);
- strategic: future pedagogues' life strategies bring out internal contradictions: between the terminal and the instrumental, between traditional and modern value systems, which emerge under the influence of factors of objective and subjective risk in combination with the material conditions of the life activity of various groups of youth;
- spiritual-moral: reliance on culture requires a pedagogically organized process: only in a pedagogically organized process there takes place the conceptualization of personified ideals of culture and are created conditions for the spiritual-moral development and bringing-up of students;
- individualized: this component helps view the preparation of future pedagogues as the development of personality, which acts as an active subject of academic activity aimed at education, self-development, and self-perfection throughout one's entire life;
- personality-oriented: the subject position of future pedagogues includes the motivation-value, cognitive, and regulative-activity aspects, which define its levels and indicators.
- subject: the following can be the criteria for the efficacy of the personality-oriented approach in work on the development of the academic independence of students included in the structure of personified education: the degree of one's consciousness of life, recognition of the values of growth and development as primary in it; one's positive perception of oneself, the profession chosen, viewing it as an opportunity to realize one's interests, potential, and values; internality; creativity; openness to life and readiness to keep learning;
- anticipational: anticipation amplifies the personification of education if one creates conditions for, above all, the regulative components of anticipation, i.e. granting students, through special organization of joint learning activity, the opportunity to take part in goal- setting, planning their learning activity and control over it; ensure students' forecasting of the content, types, and results of academic work at all or most stages of the class; in developing techniques for organizing the structural stages of the class take into account the interrelationship between the regulative, cognitive, and communicative components of anticipation;
- competence: this component presupposes including the complex of professionally oriented academic objectives ensuring the realization of the discipline's integrative links with other disciplines; the realization of context technology which governs the choice of forms, methods, and means of learning oriented towards the formation of students' motivational-value orientations, subject knowledge, abilities, skills, and personal qualities, which form the foundation of graduates' general cultural and professional competencies; the engraining of computer technology into the process of professionally oriented learning inclusive of its content and processual components; the organization of systematic monitoring of subject educational results meeting FGOS VPO requirements.

Table 1. The level of mastering pedagogic competence (%)

Bachelors and masters by years of study	Summary of the lesson	The lesson	The development of creativity	Monitoring knowledge
3rd year, bachelor	20	27	24	12
4 year, bachelors	18	21	11	7
1 course, masters	15	42	64	82
2nd year, masters	12	48	61	88

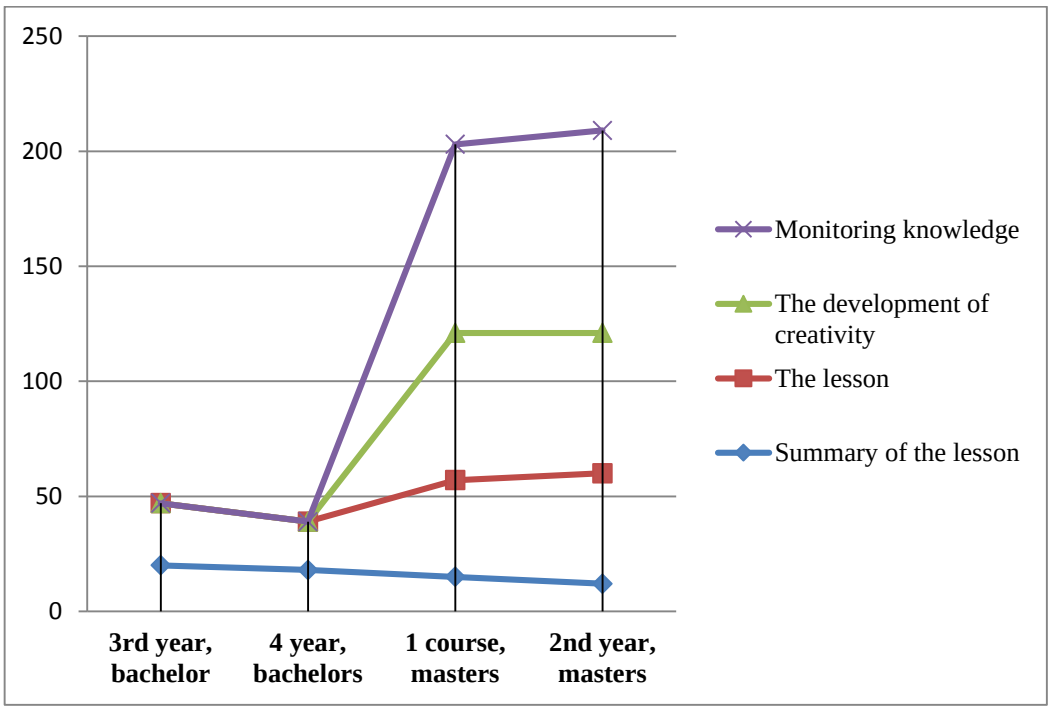

Figure 1. The level of mastering pedagogic competence (%)

The study analyzed the pedagogical competence: the ability to write the summary of the lesson, the ability to conduct a lesson, the ability to develop creativity in students, the ability to monitor students ' knowledge. In pedagogical experiment involved 412 students (287 - bachelors, 125 - masters). Bachelors practitioners were diagnosed concurrently with masters first 2 years of operation. The results show (see Table 1, Chart 1): master can significantly improve the pedagogical competence of students.

CONCLUSION

The results of the study conducted made it possible to view personification as the orientation of education towards the development and realization of the potential of each specific student in resolving life and professional issues; as the organization of pedagogical interaction inclusive of the individual characteristics of the student, instructor, and tutor; as the use of the technology of pedagogical support for and activation of the student's professional activity in the process of resolving academic-professional objectives. That said, amid the realization of the personified system, there is also likely to be the need for a special principle of personification associated with the realization of not only personality-oriented, individualized, reflexive, etc., approaches but also approaches orienting towards the self-creation of the student's personality and the making and development of language personality (personality with an individual image of language behavior) in a mixed language environment.

Tutor practice in personified education realizes the accompaniment of the entire process of construction of one's own educational program by the disciple, starting from work with one's initial cognitive interest, through deepening this interest via educational research or projects and special work on the formation of this project as educational, to tutor consulting in the area of professional educational programs.

We construe the technology of a personified type as an algorithm for the reflexive activity of two subjects of the academic-cognitive process (the instructor and the student). The algorithm is aimed at boosting the level of knowledge, developing processual (intellectual, cogitative, communicative) qualities of the student's personality, and activating one's creative independence. The algorithm comprises problem lectures which activate discussing problems dealing with students' personal educational and professional interests. Lectures provoke students to discussion and help chart individual routes of independent and project activity aimed at solving problem set. The algorithm includes seminars, workshops, consultations, on which the degree of the student's personified progress along one's route is fixed. All routes end in a conference/discussion that presents the results of each student's project study.

There are two "methodologies" in the technology of a personified type: a methodology (scenario) for the instructor/tutor and a methodology (scenario) for the student – two subjects of joint activity. The technology is built on such psychological-didactic principles as: the unity of the conscious and the unconscious in mastering the educational space and procedures for realizing it in everyday activity ("this is interesting!"); the consistent formation of the communicative nucleus through a system of stimuli which urge one towards the speech realization of an individual-personal notion of what is discussed in class ("my opinion!"); the maintaining of a high level of difficulty in operations related to the algorithmic synthesizing of learning material ("I got it!"); the creation of a pedagogical communication of equality under which the instructor and students have equal dialog interaction functions, which help transfer students from the position of an object of education to the position of an active subject of self-learning ("I did it myself!"); the formation of a nature-aligned system of self-learning under which everyone moves towards one's (often figmental) image (ideal) of a pedagogue ("I can do it too; I have ability too!").

The new approach has helped identify the indicators and determinants of pedagogical craftsmanship. The results of the study can be useful in designing new strategies for training teachers.

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