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MATHEMATICS IN REGIONAL HIGHER EDUCATION INSTITUTION UNDER CONDITIONS OF GLOBALIZATION

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Abstract

The article reveals the most significant factors caused by processes of globalization in education that influence the content and the structure of mathematics education of students in HEI. The article discloses the relationship and problem solving approaches in regional universities. The process of internationalization of students makes the issue of adjustment of international students to the educational process at the university topical. Besides, it makes teachers search for optimal conditions and teaching methods for students to master basic disciplines taking into account their language difficulties. In mathematics, the methods of enlarging the didactic units, visualization and verbalization of educational material are used. The development of professional competencies of university graduates is based on fundamental approach to mathematics; however, in the society which is rapidly developing, where the information is growing extremely fast and knowledge is becoming obsolete quickly. Practice-based learning is a new trend of modern education caused by social and economic reasons, employers' demands. The process of globalization and regionalization of education are two multidirectional processes; however, in modern education, global problems of ecology, nature conservation are solved at the level of regional research of ecology. Design and research activities of students studying issues of environment are carried out mainly in their region. The general feature in the structure and organization of the educational process at any university is becoming technologization and computerization. The content of education in the field of natural science includes new components associated with the threat of terrorism and basics of life safety.

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1. Introduction

The educational system, as part of modern society, is characterized by an increase in the integration processes and does not remain outside the influence of globalization. The globalization of education in the modern, interconnected and dynamically developing world is an inevitable, natural and objective process with both positive and negative effects. Globalization involves all participants into the educational process addressing the new challenges of a changing world, in solving global problems of humanity and the problems of training specialists for the sake of their successful socialization and implementation in the professional world. All components of this complex hierarchical system as well as all levels, including the structure, content, educational process, and its participants are involved in this process. The globalization in the educational systems and involvement into the integration processes were attributed to big research and educational centers, where academic exchange, the exchange of ideas and technologies were actively taking place, including network cooperation with universities inside and outside the country. The current stage of development of national education is characterized by active inclusion of regional universities in the integration processes and involvement in solving global problems of education. Kalmyk State University has a 50-year history and the status of a flagship university, the university takes an active part in the integration processes and gains experience and understanding of its role not only for education in the region, but also for society at large. Despite the fact that the uniqueness of the university is determined by Eastern vector regarding the linguistic problem study, the education of students in the field of natural science does not remain outside general trends of modern education and experiences the challenges of time.

2. Problem Statement

The objectives set for the education in the field of natural science in a regional university are as follows:

- 1) To identify the most significant globalization factors of education and associated problems in the field of natural science and mathematics in a regional university. To identify problems and ways to solve them, taking into account non-linear features of educational processes.
- 2) To show the influence of globalization through solving educational problems with students of natural science and mathematics, including:
 - A) internationalization of students and the problem of adaptation of international students in HEIs;
 - B) strengthening of practice-based approach in teaching natural science and mathematics;
 - C) representation of interdependence of globalization and regionalization of science study at the level of solving environmental problems.
- 3) To show the achievements and research of regional university in the context of educational processes integration as well as problem solving in the field of science study and mathematics.

3. Research Questions

What factors have the greatest influence on the current state of science study and mathematics?

What makes the current stage of development of science study different compared to the previous stages?

What are the ways to solve educational problems caused by internationalization of education and societal challenges regarding outcomes of teaching students in HEI?

4. Purpose of the Study

Identification of factors affecting the development of science study and ways to solve them in a regional university in the context of education globalization.

5. Research Methods

The theoretical and methodological bases of research were the analysis of literary sources, research works on the issues of adjustment of foreign students studying at the university, on the issue of practice-based student learning. In the process of research, general scientific methods of analysis and synthesis as well as questionnaires were used. Besides, the methods aimed at the analyses of students' motivation, outcomes of students' activities were involved in the study of practice-based learning.

6. Findings

Modern educational system is defined by researchers as a complex, multi-level, hierarchical and open system (Budanov, 2015). The accessibility of modern educational system, accessibility of educational resources, focus on new educational models, including "soft" management models are the distinctive features of educational system (Ushakova, 2002, Solodova, 2016). The educational system accessibility is manifested in the interdependence of heterogeneous components, the ability to self-organize in the development process and susceptibility to global processes.

Both transformations and changes in the global educational system in the context of globalization are considered by foreign researchers (Altbach, 2009, Browne, 2008).

As noted above, the problem of internationalization in the modern educational space is one of the important factors of globalization. Internationalization is considered as key direction of development of modern university (Moshkin, 2017).

The need to create appropriate environment for international students applying special methods and techniques during the very first days of their studies is obvious. There exist various types of adjustment (social and economic, social and cultural, communication-based); however, the most important one aimed at speeding up the adjustment process of international students is the subject and professional adaptation of students studying at a university in a foreign environment and in a new educational space.

In a broad context, the concept of "adaptability" in education means flexibility regarding the issues of restructuring and changing the content, selection of forms and methods of teaching (Vitkovskaya & Trotsuk, 2005). The ability of the system to adjust to the level of students, their specific development and interests is declared as a principle of state policy in the educational system and is enshrined in the Federal Law "On Education in the Russian Federation" (RF Government, 2012).

The problem regarding the the adjustment process of international students to the conditions of higher education is studied from the perspective of social and cultural, physiological and other aspects (Drozhzhina, 2013). However, the studies on the adjustment of international students in the field of natural

science studies are very scattered and few. For example, there are educational methods on mastering chemical terms in Russian for students who studied in an English-speaking environment. The adjustment of students in terms of mastering natural sciences from the countries of the post-Soviet space representing the majority of those students who choose the natural science studies has not been studied yet. Student surveys showed that the vast majority of this group of students is highly motivated to master their skills and knowledge. The analysis of problems of natural science teaching depicted language issues in mastering specialized disciplines, different level of knowledge and skills of students, which makes the application of multi-level learning and individual teaching approach (Vasilyeva, Khondyaeva, & Tugulchieva, 2018) demanded.

The analysis of the main problems of first-year international students training showed that students experienced difficulties as far as language communication is concerned based on the subject material of academic disciplines. The problem of the qualitative mastering of curricula in chemical disciplines, including the issue of development of students' calculated skills (Volkova, Vasilieva, Tugulchieva, & Khondyaeva, 2018). The success in education in the field of natural science depends on the level of the Russian language mastering. The share of international students in Kalmyk State University has been steadily increasing over the past 5 years (Fig. 1). The growth in the total number of international students at the university as a whole and the growth in the number of students who chose to study in the field of natural science and mathematics is shown in Fig. 1.

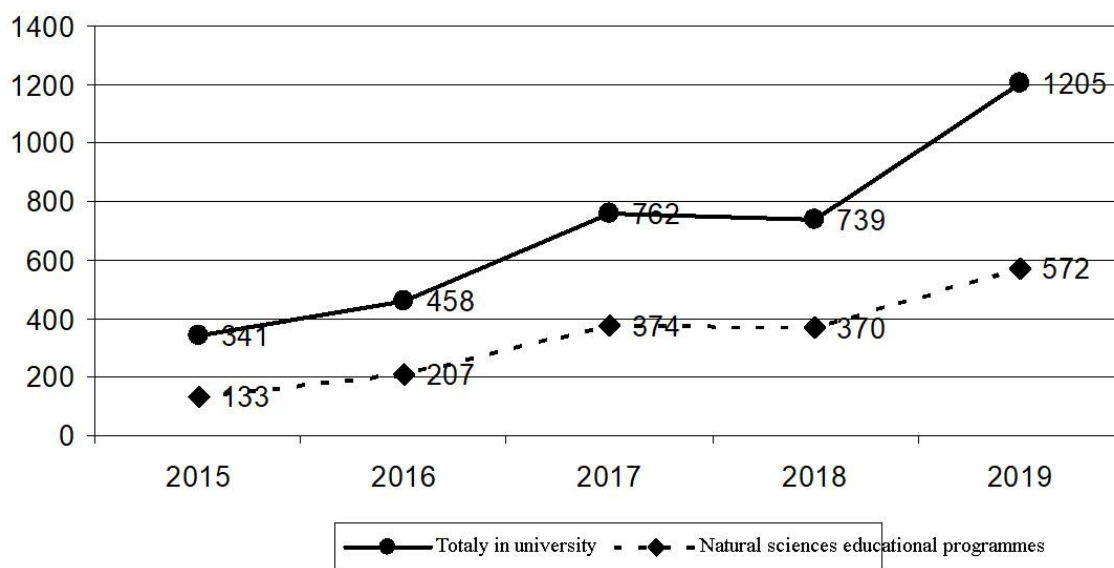


Figure 01. Growth of international students studying at Kalmyk State University

The classes organized as well as questionnaires developed for international students showed the need to create methodological developments in leading disciplines to ensure system-based approach aimed at improved and faster adjustment process. Technologies for teaching students who have not passed the preparatory departments of higher education institutions are based on the gradual complication of educational material, a differentiated approach to knowledge testing, and the flexibility of organizing the educational process. At the same time, at the very first stages, we take into account the pace of educational

material delivery, which should correspond to the language difficulties, with the repetition and emphasis on the main thing in the educational material.

The adjustment process of international students in higher educational institution depends on a favorable educational environment as well as on the support from fellow students. To ensure that students understand the educational material, we use visual tools, methods of presenting educational information in various forms, methods for converting assignments, etc. In addition to well-known adjustment technologies listed above, the theoretical material is presented using the techniques of the didactic unit enlargement technology.

In natural science, there are globalistic tendencies, among which are as follows: the universal language of science, general teaching methods and technologies, common functioning of education as a social institution (Akulich, 2005).

Until recently, Russian education was based on knowledge paradigm aimed at facilitation of the fundamental nature of education. Currently, there are identified shortcomings of the educational process carried out in accordance with the didactic triad “knowledge-skills-skills”. The need for an additional didactic unit such as “activity and experience” is noted (Yalalov, 2008). The development of modern education is aimed at the introduction and development of practice-based learning. In order to create a practice-based learning environment, Russian universities independently choose their development path, i.e. the international educational model of practice-based learning, adapting it to the conditions of their educational system. The introduction of practice-based educational models adapted to the Russian reality presupposes the existence of a close link between educational institutions and employers, who are often not ready to take responsibility for preparing students. In our region, where there is virtually no industrial production, a regional university faces the problem of creating a practice-based learning environment, carrying out internship training (production training) of students, which often takes place in the institutions of another region.

The analysis of foreign practice-based learning models showed that the basis of learning for each of them is based on certain practice-based learning technologies, among them are the design technologies and case-based technologies. Despite positive aspects of applying these technologies such as development of research skills, presentation of prepared material, development of creative abilities, and real situations analysis (case-based technologies) we should not forget that a significant drawback of these technologies is that they are time consuming compared to classical teaching methods (Smirnov, 2012). Based on the analysis of practice-based technologies, the choice of a context-based technology as the main technology for implementing a practice-based approach in teaching natural science studies and mathematics is substantiated (Verbitsky, 2006).

At the initial stage of training, practice-based training for core and non-core disciplines can be carried out through the introduction of the contextual tasks into the content of disciplines. The solution of the contextual tasks in the framework of non-core disciplines allows establishing interdisciplinary connections, to show the significance of concepts and methods studied in the framework of non-core disciplines for their future professional activity. The need to introduce contextual tasks was noted by students.

7. Conclusion

The development of universities expressed by the internationalization of students has been defined by such factors as accessibility of modern education and educational information, lack of boundaries for dissemination of knowledge, migration of students looking for more suitable options in obtaining higher education and so on. The changes regarding participants in the educational process revealed the need to create favorable educational environment at the university, identified the need to use technologies and methods to improve the adjustment of international students to the process of studying. The university studies the level of motivation of international students towards their future profession, identifies the main difficulties in the development of natural sciences and mathematics. The practice of teaching students natural science showed a great dependence of the influence of mathematical competence on the level of readiness for the future profession. Thus, the study carried out to find out the most troublesome subject areas for students proved the fact of the importance of mathematics in mastering the future. Participation of students on regular basis in the Internet testing, in student's contests, as well as continuous check-ups of students' knowledge show that students are mostly challenged by practical tasks. The results obtained determined the relevance of strengthening practice-based learning through the introduction of practical tasks. The inclusion of regional component in the content of environmental research projects of students allows them to draw attention to practical application of methods for analyzing natural objects through the study of ecological state of the region to an understanding of global environmental problems.

The analysis of higher education development trend in the context of increasing integration processes shows the involvement of all participants in the educational process in solving problems caused by growing globalization of education. The internationalization of students, which is a positive factor in the development of regional university, bears the problem of updating the content and methods of multi-level education, the problem of adjustment students to new conditions to achieve outcomes in the field of education.

Another direction in the development of science and mathematics is the introduction of methods of practice-based education in order to build skills to apply knowledge and enhance cognitive interest and motivation to acquire professional competencies.

Kalmyk State University as a flagship regional university has a technology aimed at consolidating didactic units. The technology is known in pedagogy in the country and beyond. The new methods of training are aimed to achieving the systematic knowledge in natural science disciplines.

Changing priorities regarding the establishment of educational process, employers' requirements for graduates' learning outcomes and internationalization are seen as an impetus for the development of educational environment of university, forcing teachers to switch to more sustainable teaching methods and techniques to achieve planned educational outcomes.

References

- Akulich, M. M. (2005). Education in the context of globalization. *University Management: Practice and Analysis*, 5, 50–57.
- Altbach, P. G. (2009). Trends in Global Higher Education: tracking an academic revolution. In *UNESCO 2009 World Conference on Higher Education*.
- Browne, L. (2008). Change or transformation? *Journal of Further & Higher Education*, 32(4), 427–439.

- Budanov, V. G. (2015). *Methodology of synergy in post non-classical science and education*. Moscow: Book House "LIBRIKOM".
- Drozhdzhina, D. S. (2013). Study adjustment of international students: discussion about methodology. *Universitas*, 1(3), 33–47.
- Moshkin, I. V. (2017). Globalization of university education (Southern Federal University). *Journal U. Economics. Control. Finance*, 4, 36–43.
- RF Government (2012). Federal Law “*On Education in the Russian Federation*” of 12/29/2012 N 273-F.
- Smirnov, V. I. (2012). *Didactics. Part II. Learning process technologies*. Nizhny Tagil: Nizhny Tagil State Socio-Cultural Academy.
- Solodova, E. A. (2016). *New models in the education system: synergistic approach*. Moscow: Book House "LIBRIKOM".
- Ushakova, M. V. (2002). Education in a transforming society. *Moscow University Bulletin*, 4, 147–158.
- Vasilyeva, P., Khondyaeva, T., & Tugulchieva, V. (2018). Adaptation of first-year international students in teaching chemistry and mathematics at the university. In *DidSci Plus – Research in Didactics of Science PLUS Proceedings of the International Conference Charles University – Faculty of Science Prague, 25th-27th June 2018* (pp. 449–455). Charles University, Faculty of Science.
- Verbitsky, A. (2006). Contextual learning in the competence-based approach. *Higher education in Russia*, 11, 39–46.
- Vitkovskaya, M. I., & Trotsuk, I. V. (2005). Adjustment of international students to life and studies in Russia (RUDN). *Bulletin of Peoples' Friendship University of Russia. Series: Sociology*, 6–7, 267–283.
- Volkova, S. A., Vasilieva, P. D., Tugulchieva, V. S., & Khondaeva, T. V. (2018). Implementation of the system approach in continuing natural science education. *Espacios*, 39, 12.
- Yalalov, F. (2008). Activity and competence based approach compared to practice-based education. *Higher education in Russia*, 1, 89–93.