

Development of information competence of rural school teachers in the context of e-learning implementation at Russian universities

Desarrollo de la competencia informativa de profesores de escuelas rurales en el contexto de la implementación del aprendizaje electrónico en universidades rusas

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ABSTRACT:

The article considers teacher training through e-learning in Russian schools and universities for working in the information educational environment of rural schools. The authors developed and tested the methodology aimed at developing the information competence of prospective teachers in rural school; this methodology would enable to update the scientific and methodological approaches to teaching IT subjects and take into account the continuity of its cycles. The study conducted among undergraduates proved the need to consider the specifics of the educational environment of rural schools regarding the development of information competence in the context of e-learning

Keywords: information competence, rural school, learning environment, e-learning, teacher training

RESUMEN:

El artículo considera la formación docente a través del e-learning en las escuelas y universidades rusas para trabajar en el entorno educativo de la información de las escuelas rurales. Los autores desarrollaron y probaron la metodología destinada a desarrollar la competencia de información de futuros profesores en la escuela rural; esta metodología permitiría actualizar los enfoques científicos y metodológicos para enseñar materias de TI y tomar en cuenta la continuidad de sus ciclos. El estudio realizado entre estudiantes universitarios demostró la necesidad de considerar las características específicas del entorno educativo de las escuelas rurales en relación con el desarrollo de la competencia de la información en el contexto del aprendizaje electrónico.

Palabras clave: competencia de información, escuela rural, entorno de aprendizaje, e-learning, formación

1. Introduction

At the present stage of social development and in the context of increasingly complicated production relations, technical and social infrastructure, it is crucial to change the attitude of educational institutions to the training of rural schools teachers of all majors (Neustroev and Neustroeva, 2015). Universities welcoming innovations contribute to the formation of an effective national system of education (Nikolaev, 2015). Introduction of innovations into education is conditioned by many factors, including steadily increasing requirements to its quality and teacher training in the conditions of e-learning implementation (Barakhsanova et al., 2016).

Having studied regulatory documents on the implementation of e-learning in Russian schools and universities, we can conclude that it is introduced into learning and research activities of students in accordance with the Federal State Educational Standard, which proves the special importance of IT technologies education in general, and in particular, the use of e-learning and distance educational technologies (Barakhsanova and Vlasova, 2014).

To study this issue, the authors found it viable to analyze the views of international and Russian researchers on the theoretical issues of training teachers and managers in the field of electronic education.

Regarding the problem of bilingualism, international authors (García-Mateus and Palmer, 2017) note the importance of linguistics pedagogy which facilitates the positive self-identification in bilingual education.

It should be noted that Marco R uth and Kai Kaspar (2017) claim that an e-learning project and related research are providing more and more evidence of their great potential in various subjects and contexts.

At the same time, the implementation of e-learning regarding the essence and specifics of the educational environment of rural schools has not been sufficiently studied by researchers as far as the methods of teaching certain subjects are concerned.

The problem of the research stems from the need to solve one of the tasks of modernization of national and regional education in Russia and is connected with the need to implement e-learning taking into account the specifics of the educational environment of rural schools.

These problems let us formulate the goal of the study – to determine the organizational and pedagogical conditions for the implementation of e-learning, taking into account the educational environment of rural schools in the North-East of Russia.

To achieve the goal, the following tasks were set: to analyze the global and Russian experience in the field of e-learning implementation, to identify the specifics of training prospective teachers of rural schools in the context of e-learning implementation, taking into account the specifics of the educational environment of rural school and based on the case study of the Republic of Sakha (Yakutia) maintained.

1.1. Literature review

1.1.1. Analysis of the Russian scientific and pedagogical papers.

Analysis of papers by Russian authors shows that e-learning provides an opportunity to take a new approach to solving the problems related to the development of educational system, first of all, considering them from the perspective that implies "openness", co-creation and self-development (Barakhsanova and Vlasova, 2014).

At the present stage of the information society development, with increasing complexity of production relations, its technical and social infrastructure; it is crucial to change the attitude of educational institutions to training specialists in any field (Barakhsanova, et al., 2015). Institutions pursuing innovations contribute to the formation of an effective national educational system. Introduction of IT technologies into education in a multicultural region is considered in the works of M.P. Lapchik, A.N. Taryma, M.S. Prokopiev and others.

Introduction of e-learning in education is conditioned by many factors, including steadily increasing demands on the quality of education and staff training (Barakhsanova et al., 2016). The research papers and monographs of the scientific schools of E.Z. Vlasova (RSPU) and E.A. Barakhsanova (NEFU), published in co-authorship, state that the new information age has brought in qualitatively new opportunities in the field of teacher training. At the same time, the speed of information and communication technologies (ICT) development is much greater than the time required to produce significant effect from their application in schools and universities. In many respects, this is due to the human factor since the teacher is the main provider of new educational services in school and university.

1.1.2. Analysis of the international research

It should be noted that international researchers have paid significant attention to the application of e-learning in higher education (Gaebel, 2014), the development and implementation of adaptive technologies in specialists training, including teachers (Skoulikari, 2015, Chen, 2016).

The papers consider the implementation of e-learning systems that promote learner-centered and adaptive learning, including courses available through mobile environments and devices. A number of works discuss various aspects of teachers training in the context of inverted and ubiquitous learning which is becoming more wide-spread (Chen, 2016), transforming educational needs for innovative electronic information and educational environments (Schulz, 2014), along with the increasing economic and market factor in the motivation for learning (Clark, 2016) and taking into account the evolution of interaction between educators and students (Mohammad, 2013). The authors of the articles give examples of methods to assess the readiness of the teaching staff of higher educational institutions to solve professional problems using e-learning technologies.

Some researchers (Olsson et al., 2015) claim that control and motivation of students are crucial for online education which is designed to improve ways to manage students and understanding of programming and gaming concepts as a way to increase research motivation in virtual learning environments. In addition, two prototypes of visualization in lectures programming were developed and assessed.

The results show that visualization of the progress indicators is a good way to improve the quality of educational courses management and can provide better navigation in online environments with rich and comprehensive content. To some extent, visualization makes the course easier, but on the other hand, the assessment is not easy since students have different learning styles, and thus, different visualization approaches are required. Visualization software should be seen as a promising way to improve programming education in the 21st century.

T. Almpanis (2016) considers the prospects for the development of e-learning (HeLs), in particular, the technology of enhanced learning (TEL) based on a campus in the UK. The work is aimed at facilitating the research project and the research methodology applied, providing reliable proofs in favor of mixed approaches for e-learning. Digital skills and competencies of the teaching staff combined with teaching reinforcement, as well as the institutional culture, have been recognized as factors facilitating the effective implementation of TEL, according to the HeLs expert.

2. Methodology

The experiment was conducted at the Department of Informatics and Computer Engineering of M.K. Ammosov North-Eastern Federal University. The study involved 300 master students enrolled at the Teacher Training Institute at five master programs. The age composition and qualifications of students according to their majors are given in Table 1.

Table 1
Age and gender composition of master students participating in the research for the period from 2016 to 2017.

Age	25-34 y.o.	70% (210)
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	35-55 y.o.	30 % (90)
Master programs	Technology and Management of E-Learning	25% (75)
	Project Management in Education	20% (60)
	Innovative Processes in Education	20% (60)
	Family Tutoring	15% (45)
	Elementary Education	20% (60)

A survey was conducted among 300 master students of the NEFU to analyze the implementation of e-learning in master educational programs. The survey was carried out in written form.

3. Results

Analysis of questionnaire answers of the students in these five educational programs shows that e-learning is the universal communication tool which enables the development of the information competence of teachers taking into account the specifics of the educational environment of the rural school.

As part of the research, we conducted the experiment the main goal of which was to check the implementation of e-learning when teaching the subject common for all master programs – Information and Communication Technologies (ICT) in Education. The study included the following stages: preparatory, formative and generalizing.

At the preparatory stage, we studied the content of this subject that was the same for larger groups of teacher training programs. For this, we assessed the general and informational competence of prospective rural schools teachers when mastering the subject "ICT in Education" for larger groups of specialties (ICT, Primary Education and Pedagogy). In addition to that, we determined the information and educational environment required for the implementation of the research tasks and selected a certain group of students to take part in the pedagogical experiment.

At the formative stage, we altered the conditions under which e-learning was implemented to correspond with the educational environment of rural schools when teaching IT subjects in a pedagogical university and mastering the content of "ICT in Education" by prospective teachers of rural schools.

The results of the study were systematized and validated at the final stage of the experiment.

The information and educational environment (ITE) plays the crucial role in the effectiveness of the teaching methodology. For this purpose, we analyzed scientific and methodological works published over recent decades and devoted to the implementation of e-learning in higher educational institutions in Russian regions, considering the specifics of the educational environment of the rural school in Yakutia.

We identified the level of information competence the prospective teachers possessed since it is formed, developed and manifests itself in projects done in various subjects (Table 2).

Table 2
The level of information competence demonstrated by prospective teachers

Competence components	Percentage, (%)
1. Search, input, processing, output of the required (heterogeneous) information using information and communication technologies.	70.5

2. Presenting information through texts, images, formulas, video content in various forms, working with data via telecommunication channels.	64
3. Application of modeling tools. Carrying out different experiments in a virtual environment.	40.4
4. Self-expression in the Internet (creation of unique content) using modern ICT tools.	80
5. Mastering the methodology of creating educational ICT (development of the content and methodology of using it to model situations occurring in professional activities).	78
6. Understanding the limitations and opportunities for using information and communication technologies in the educational environment of rural schools.	82
7. The ability to qualitatively evaluate the developed competences with various evaluation methods (tests, projects, etc.).	42.3
8. Ability to include teaching and educational activities in lessons using ICT technologies.	52.3
9. Understanding the psychological and pedagogical problems arising in the course of the interaction of a teacher, a student and a computer in learning.	70
10. Using information and communication technologies for reception, transmission and processing of various data.	68.9

Considering that prospective teachers have different degrees of maturity, the authors worked out different levels of the information competence as follows: critical level, satisfactory level, and productive level for groups studying "Technology and Management of E-Learning" – Group 5, "Project Management in Education" – Group 3, "Innovations in Education" – Group 4, "Family Tutoring" – Group 2, "Primary Education" – Group 1.

Table 3
Levels of information competence

Groups	Year	Levels of information competence in the group (% of students)		
		critical	satisfactory	productive
		Motivation and Values		
Group 1	1-2	60.2	30.8	9
Group 2	1-2	56.4	36.2	7.4
Group 3	1-2	54.6	38.2	7.2
Group 4	1-2	40.0	58.0	2
Group 5	1-2	32.8	61.5	5.2
		Reflection and Assessment		
Group 1	1-2	46.2	53.8	-
Group 2	1-2	45.5	54.5	-
Group 3	1-2	55.6	44.4	-
Group 4	1-2	50.0	50.0	-

Group 5	1-2	40.0	50.0	10.0
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Analysis of the levels of information competence during the component assessment shows a positive dynamics in all groups, with the highest result in Group 5 – Technologies and Management of E-learning.

The majority in the experimental group (65.5%) noted that they were motivated by the educational project itself, the result of which should become a “significant learning outcome”. The success of the methodology aimed at the development of information competence and taking into account the regional component is proven by the reduced language barrier of students, as well as the interest and further use of e-learning components in their teaching in the rural school of Russian regions after graduation. The decrease of the language barrier is shown in Table 4.

Table 4
The language barrier dynamics

Average language barrier when enrolling at university	Fear of public speaking	The average score for the first test
41.64%.	7%	23.34%
Speaking skills in the beginning of the training	End of academic year	Average score in groups
3.64%	4.5%	84.33%
Average language barrier when enrolling at university	Fear of public speaking	The average score for the first test
41.64%.	7%	23.34%
Speaking skills in the beginning of the training	End of academic year	Average score in groups
3.64%	4.5%	84.33%

Thus, the improvement of speaking skills can be observed when developing the information competence: speaking skills estimated 3.64% in the beginning of training and by the end of the academic year this figure increased to 4.5%; the average score in the groups also went up to 84.33%.

3.1. Discussion

Teacher training in the educational environment of rural schools in the context of e-learning implementation is one of the priorities in the development of the education system in the Republic of Sakha (Yakutia) and is part of the Program for the Development of the Pedagogical Universities of Russia until 2020. The relevance of information competence is confirmed by a number of documents that determine the state policy aimed at increasing its level and intensifying the use of information and communication technologies: “Strategies for the Development of Information Society in the Russian Federation for 2017-2030”, “Strategy for the IT Development in the Russian Federation for 2014-2020, and later up to 2025”, the State Program of the Russian Federation “Information Society (2011-2020)”.

The effectiveness of e-learning through IT technologies in schools and universities in the North-East of Russia should be increased with regard to the specifics of the educational environment of rural schools and a number of factors: the creation of the material and

technical resources, training teachers in information technology, development and creation of electronic resources for subjects, assessment of the level of information competence of school teachers, socio-cultural issues and accessibility of ICT for prospective teachers, taking into account the specifics of the educational environment of rural schools in Russian regions. For instance, effectiveness of training through technologies can be greatly facilitated by teacher's speech and by promoting the effective use of technology in teaching and learning by researchers and practical experts such as Collis, Hirumi, Palloff and Pratt.

Stylianos Hatzipanagos and **Jon Gregson** (2015) consider the role of open access and learning resources for distance education, and they focus on the example of the London University of the Program. The study reveals some opportunities, while the results allowed the researchers to formulate the recommendations for both educators working in the field and students.

Signe Schack Noesgaard and Rikke Ørngreen (2015) reviewed and studied the effectiveness of e-learning through an integrative review. The authors found 19 different ways to determine the effectiveness, the most common of which is the "learning outcome", which was registered in 41% of the articles studied in the literature review.

Moreover, the most common way of measuring efficiency is using pre- and post-analysis with an empirical study of e-learning solutions for science teachers; this adds some valuable data to the findings of the literature review.

The authors believe that it is difficult to use e-learning to improve training since teachers who take part in the program can apply several strategies to avoid a significant change in their working practices. In addition, it is noted that focus on the fulfillment of specified learning objectives as the efficiency parameter prevents developers and researchers from noticing unexpected and unintended practical changes caused by e-learning in a particular educational environment.

Jamie Costley and Christopher Lange (2016) consider educational design important as it helps to establish the discourse, context and content of learning in online mode.

The Professors of the NEFU (Barakhsanova et al., 2015) and the RSPU (Vlasova, 2014) note that, primarily, e-learning plays an important role in the development of information competence of university teaching staff.

The master programs under consideration enable to implement e-learning and create a number of special courses that reflect the educational needs of rural schools. Master programs include subjects of integrative, interdisciplinary nature in the field of education and pedagogy and allow students to obtain interdisciplinary knowledge. This includes such issues as management and models of e-learning, regarding the specifics of the educational environment of rural schools, the information training of rural school teachers on the basis of a competency-based approach, the scientific and methodical training of students to use electronic resources as a tool for the development of information competence when implementing e-learning in schools and universities.

4. Conclusions

E-learning implementation in schools and universities is developing rapidly and is becoming more wide-spread in Russia. Despite a considerable backlog in this field, e-learning in rural schools in Yakutia is taking place within the framework of the adopted regulatory legal documents and orders of the Ministry of Education of the Russian Federation. However, the development of educational materials for rural schools is very labor-intensive, requires a certain level of skills and can be successful only if the national-regional component is taken into account in the course of teachers training in Russian universities.

The implementation of e-learning in rural schools in Yakutia is determined by the development of information training of prospective teachers in Russian pedagogical universities. It should be noted that this is a target process of organizing and developing methodological structures so that any educational institution or university can interact with other educational establishments and exchange ideas regarding the development and

creation of new electronic resources for academic subjects that reflect the specifics of the educational environment of rural schools.

E-learning contributes to the restructuring of the educational process in rural schools which are looking for new forms of interaction with students, parents, and a new model that would enable to achieve the set tasks related to the implementation of e-learning.

It should be noted that the implementation of e-learning not only facilitates the dissemination of innovations, but also interaction of schools and universities aimed at the organization of the educational process that reflects the specifics of rural schools in Russia.

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