

Current trends in digital education development in the Republic of Sakha (Yakutia)

Tendencias actuales en el desarrollo de la educación digital en la República de Sakha (Yakutia)

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ABSTRACT:

The research was based on the observation of the future teachers training process dynamics, pedagogical experiment and mathematical statistics methods. Bachelor and Master's Degree students of the M.K. Ammosov North-Eastern Federal University (majoring in "Pedagogics") were involved in the experiment. The authors' identified some brand-new trends, which provide a way to speed up the rate of regional digital education development, and proved the necessity to enhance educational practical training for examining the pedagogical potential of digital education tools in professional activities.

Keywords: digital education, digital technologies, on-line testing, the Arctic zone, teacher trainin

RESUMEN:

La investigación se basó en la observación de las futuras dinámicas del proceso de formación docente, experimentación pedagógica y métodos de estadística matemática. Alumnos de licenciatura y maestría de la Universidad Federal del Noreste de Ammosov (con especialización en "Pedagogía") participaron en el experimento. Los autores identificaron algunas tendencias completamente nuevas, que proporcionan una manera de acelerar la tasa de desarrollo de la educación digital regional, y demostraron la necesidad de mejorar la capacitación práctica educativa para examinar el potencial pedagógico de las herramientas de educación digital en actividades profesionales.

Palabras clave: educación digital, tecnologías digitales, pruebas en línea, la zona ártica, formación docente

1. Introduction

M.K. Ammosov North-Eastern Federal University (NEFU) and M.V. Lomonosov Northern (Arctic) Federal University (NArFU) are rightly considered to be the main scientific and educational institutions in the Arctic Zone of the Russian Federation (AZRF). However, the

Arctic Zone educational institutions are ranked in the middle and at the bottom of the statistical indices based rating list. Thus, according to "RA Expert University Ranking – 2016", NEFU was ranked 45th (58th in 2015), while NArFU has not even got into TOP – 100, but was ranked 94th in 2015, and the 90th in 2014. It is worthy to note, that a lot of regional non-Arctic universities prepare the specialists for the Arctic Zone. Among them are the Siberian Federal University (SibFU, ranked 15th in 2016) and Far Eastern Federal University (ranked 36th). In St. Petersburg teachers for the Arctic Zone are trained at the Arctic Youth Competence Center. The historical event, namely the agreement on establishment of the National Arctic Research and Educational Consortium, took place in Arkhangelsk in June, 2016 under the auspices of NArFU. Fourteen participants became members of this Consortium. Moreover, the Federal Program as to the AZRF activity support was developed aimed at decreasing the population flow-out from the Arctic Zone of the Russian Federation. The program included the following aspects: state guarantees and compensations for the effective socio-economic regional and municipal development, ensuring of the real income increase in accordance with the inflation rate and high cost of living in the Arctic Zone, living conditions improvement, housing for the young specialists construction and the indigenous nations of the North integration into a single economic Arctic space. Such complex approach will not only ensure development of the mining economy, which is typical for the AZRF, but influences the education development. Nowadays, the educational system in Russia is rapidly improving and developing. One of the approaches, which is the basis for almost all the aspects of the human living in the 21st century, including the education, is e-learning. In researches, e-learning is more often regarded as the effective means of education, which helps optimizing the staff training process, especially during the economic recession period (Vlasova, 2014). The analysis of the normative documents as to the e-learning process realization in schools and higher education institutions in Russia shows that educational, teaching and research processes and scientific research work are held in accordance with the Federal State Educational Standards (FSSES), that indicates the important role of the educational process informatization in general, and particularly, its usage in distant learning technologies (Marchyuk, 2013). However, the content and the particularity of the digital education implementation in school teachers training is not well established in regional educational system of the Republic of Sakha (Yakutia) (Sorochinsky, 2017). The problem of the research is determined by the necessity of improving the regional education in Russia. For that reason digital education should be implemented. The expected result would reflect the partnership interrelation of Russian universities in teacher training and the implementation of the Government Decree on introduction of the Digital Economy in education.

The outlined problems have specified *the purpose of the research*, namely, to prove theoretically the mechanisms of using the pedagogical potential of the digital education when training future teachers in higher education institutions in the Republic of Sakha (Yakutia) through foreign and domestic researchers' works analysis. We believe that the theoretical understanding of the digital education implementation in higher education institutions in the Republic of Sakha (Yakutia) has contributed to the definition of the specific features of the digital education at schools and universities. In addition, the essence of students' digital dependence was determined in educational activities and in practice. (Barakhsanov et al., 2018).

1.1. Literature review

Foreign researchers have accumulated the great experience in e-learning implementation and development in different aspects of the educational process. I. Levin (2013) offered a conceptual model of a new education system, defined by three levels that influence education, such as: social networks as a new way of social conscience formation, personal online identity as a new way of the personality formation, and Data Intensive Science as a new methodological paradigm. It is believed that these three phenomena are very important and developed from three relevant areas. A varied social network content, that stimulates the students' online personality development, presents a new kind of education that changes all its components, namely: the content, the curriculum, the educational environment.

D. Bawden and L. Robinson (2016) examine briefly the upcoming changes in the information environment, particularly, the infosphere and immersive documents, as well as their importance for library and information science, emphasizing the topics touched upon by Tatiana Aparac-Jelušić and coauthors (2013). The new trends features, new models of the informational behavior and competence, their influence on education and professional training, theory and practice correlation are analyzed. The given problem can be better solved with the help of a wide discipline with the strong investigation and theory basis, practice interaction, fundamental formal education, with further learning. Keeping in mind these conditions, we believe that Informative System of Education has great prospects.

L. Teichert (2017) points out that a lot of children use digital devices such as mobile phones and pads. The advisability of the devices usage by younger children was argued a lot (e.g., the American Academy of Pediatrics, 2001, 2011; National Association for the Young Children Education, 2012). However, parents still permit their children to use digital devices uncontrollably. The given survey is based on the current researches of the digital competence growth, having the families' digital competence practice in focus. With the spread of the technologies at home, parents are advised about their use by young children. The present situation with the parents' moral responsibility for involving the children into mass media security work, which creates the awareness and mediated supervision of the parents and teachers media use, was analyzed. This document gives significant recommendations as to the children protection from the harmful media effect that grows naturally in a correspondent social environment.

P. Walton (2015) studies the correlation between the results and the value, the selection process, some information attributes and the changes in correlation when there is a modification from analogous to digital information. Selection processes form the information ecosystems evolution, where the conventions as to the information use are set up. C. Belisle and E. Rosado (2006) report that the competence not only presents the methods and means for texts and figures work in a definite cultural and ideological aspect, but also brings the important enrichment with subsequent human mind capabilities transformation. This intellectual enrichment takes place every time when the mankind gets new cognitive tools, such as writing, or alongside with the tools, the digital technologies made possible. D. Belshaw (2012) distinguishes the following eight components for the digital competence development: the cultural, the cognitive, the structural, the communicative, the confident, the creative, the critical and the cooperative ones.

The experts of SKOLKOVO Education Development Centre presented the review of NMC Horizon new report as to the higher education role in the nearest five years. To help the universities, NMC Horizon prepared the report "Higher education – 2017", where the influence of the new methods and technologies on the higher education system in the nearest five years is analyzed. NMC (The New Media Centers) reports have been issued since 2002 and are recognized by the scientists and practitioners all over the world.

It is worthy to note that the publications of such foreign authors as T.E. Vick, M.S. Nagano, and S. Popadiuk (2016) are devoted to the informational culture and its influence on the knowledge formation. The university teams' experience in cooperative innovative projects is analyzed. Our special attention is paid to the analysis of studies conducted by M. Salehan, D.J.Kim and J.N.Lee (2018). The principal question is if there is a connection between the technology and cultural values. The correlation between the informational technologies and cultural values is studied in this connection. Educational tools and nonstandard thinking are presented by M. Woods and M. Rosenberg (2016). A.M.Kaplan and M.Haenlein (2016) express their attitude to the higher education development, digital revolution and social networks.

It should be noted that the problem of digital education and its mechanisms in the specific sphere of national and regional education system of AZRF and also in professional activity isn't investigated properly.

The theoretical basis of the survey is formed by publications of Russian scholars in the sphere of e-learning and digital education (M.S Prokopiev, 2015; L.F. Sorochinsky, 2017; Tretyakova et al., 2017; Vlasova et al., 2018).

2. Methodology

The given survey was held at the department of Informatics and Computer Science in M.K. Ammosov North-Eastern Federal University in the period from 2015 to 2018. Some 292 Master's Degree teachers, 308 Bachelor students and 236 pupils from 24 schools of the Republic of Sakha (Yakutia) were involved in the experiment. For the further experiment, the Bachelor students were divided into groups, the sampling included was 28 people from different departments of the Pedagogical Institute of M.K. Ammosov North-Eastern Federal University. The results of one of the groups are presented in Table 1.

The level of the testees' preparedness is calculated by formula:

$$\theta_i^0 = \ln \frac{p_i}{q_i}, \text{ where } p_i = \frac{X_i}{M} \text{ is a share of the testees' correct answers; } q_i = 1 - p_i \text{ is a share of the testees' incorrect answers; } M \text{ is the quantity of tasks in the test; } X_i \text{ is the personal score of the } i\text{-th respondent, } R_j \text{ is the quantity of correct answers to the } j\text{-th task, } W_j \text{ is the quantity of incorrect answers to the } j\text{-th task.}$$

Table 1

The initial index of preparedness level in one group

No	Correct answers	Mistakes	X _i	p _i	q _i	e _i ⁰	(e _i ⁰) ²
1	8	20	8	0.285714	0.714286	-0.91629	0.839589
2	9	19	9	0.321429	0.678571	-0.74721	0.558329
3	7	21	7	0.25	0.75	-1.09861	1.206949
4	13	15	13	0.464286	0.535714	-0.1431	0.020478
5	13	15	13	0.464286	0.535714	-0.1431	0.020478
6	16	12	16	0.571429	0.428571	0.287682	0.082761
7	16	12	16	0.571429	0.428571	0.287682	0.082761
8	14	14	14	0.5	0.5	0	0
9	9	19	9	0.321429	0.678571	-0.74721	0.558329
10	15	13	15	0.535714	0.464286	0.143101	0.020478
11	14	14	14	0.5	0.5	0	0
12	17	11	17	0.607143	0.392857	0.435318	0.189502
13	14	14	14	0.5	0.5	0	0
14	13	15	13	0.464286	0.535714	-0.1431	0.020478
15	13	15	13	0.464286	0.535714	-0.1431	0.020478
16	23	5	23	0.821429	0.178571	1.526056	2.328848
17	14	14	14	0.5	0.5	0	0
18	18	10	18	0.642857	0.357143	0.587787	0.345493
19	19	9	19	0.678571	0.321429	0.747214	0.558329
20	12	16	12	0.428571	0.571429	-0.28768	0.082761
21	15	13	15	0.535714	0.464286	0.143101	0.020478
22	10	18	10	0.357143	0.642857	-0.58779	0.345493
23	23	5	23	0.821429	0.178571	1.526056	2.328848
24	14	14	14	0.5	0.5	0	0
25	4	24	4	0.142857	0.857143	-1.79176	3.210402
26	16	12	16	0.571429	0.428571	0.287682	0.082761
27	12	16	12	0.428571	0.571429	-0.28768	0.082761
28	12	16	12	0.428571	0.571429	-0.28768	0.082761

Then the initial index of the task complexity β_j was calculated:

$$\beta_j^0 = \ln \frac{q_j}{p_j}$$

The calculation results are given in Table 2.

Table 2
The initial index of the task complexity

J	Quantity of correct answers	P _j	q _j	b _{j0}	(b _{j0}) ²
1	24	0.857	0.142	-1.791	3.210
2	15	0.535	0.464	-0.143	0.020
3	20	0.714	0.285	-0.916	0.839
4	18	0.642	0.357	-0.587	0.345
5	28	1	0		
6	15	0.535	0.464	-0.143	0.020
7	27	0.964	0.035	-3.295	10.862
8	18	0.642	0.357	-0.587	0.345
9	27	0.964	0.035	-3.295	10.862
10	30	1.071	-0.071		
11	13	0.464	0.535	0.143	0.020
12	17	0.607	0.392	-0.435	0.189
13	16	0.571	0.428	-0.287	0.082
14	24	0.857	0.142	-1.791	3.210
15	25	0.892	0.107	-2.120	4.495
16	14	0.5	0.5	0	0
17	7	0.25	0.75	1.098	1.206
18	20	0.714	0.285	-0.916	0.839
19	21	0.75	0.25	-1.098	1.206
20	6	0.214	0.785	1.299	1.688
21	13	0.464	0.535	0.143	0.020
22	3	0.107	0.892	2.120	4.495
23	15	0.535	0.464	-0.143	0.020
24	2	0.071	0.928	2.564	6.578
25	7	0.25	0.75	1.098	1.206
26	6	0.214	0.785	1.299	1.688
27	11	0.392	0.607	0.435	0.189
28	5	0.178	0.821	1.526	2.328

The parameters of θ and β are calculated on a single interval scale:

$$\theta_i = a_{\theta} \theta_i^0 + \bar{\beta}_i$$

$$\beta_j = a_{\beta} \beta_j^0 + \bar{\theta}_j$$

The following results we obtained: $\theta_i = -0.21939$, $\beta_j = -0.22407$

According to the test results, some inapplicable tasks (too easy or too difficult ones) could be omitted and those, which define the knowledge level in the best way, could be retained.

For more detailed studying of the digital education importance in the Republic of Sakha (Yakutia) the online survey among pupils was held, as the given methods allow getting quick and accurate results regardless of the respondent location. Some 236 pupils from 24 schools of the Republic of Sakha (Yakutia) were involved in the survey. The average age of the respondents is 13.9. Among them there are 119 village schools pupils, that is 50.4% of the whole amount of the respondents.

There is no access in the Republic of Sakha (Yakutia) to the wire line communication channel, due to the remoteness of the territories, poorly developed communication channels, as well as its high cost of living, in contrast to the central part of Russia. But with the development of informational technologies, such as satellite communication channels,

the possibility to provide the mobile internet access appeared. That is why 95% of the respondents have personal smartphones or pads. Some 35% of the respondents have personal computers with the internet access at home. Only 8% of the respondents have unimpeded access to the school computer. It means that there is no sufficient access to the Internet in Yakutia schools.

Analyzing the online activity, we came to the conclusion that 79% of the respondents look for some interesting information in the Internet, including pictures, videos, music and news. Less than 54% of the respondents look for the information that is necessary for studying, only 22% of the respondents visit educational sites, the same amount of the respondents take online courses. Online communication, as it was expected, has the leading place in pupils' online activity. Some 69% of the pupils communicate with their friends in social networks, and 38% of them constantly follow their friends' stories updates. Another 31% of the respondents play online games, while 29% read internet media, 12% prefer writing comments and taking part in discussions, 4% have personal blog, including video blog on YouTube. Some 21% of the respondents are the online shops young customers and take part in various auctions, while 6% of the respondents are online banking clients, the same amount of the respondents receive the state services via Public services portal. Low internet speed, the lack of money for the legal content make 45% of the respondents download movies, music and other products. As it is presented, the pupils' activities vary a lot. It is required to increase the educational sites visiting and the online courses involvement, while regarding the digital sphere possibilities not only as a consumer, but as a content creator point of view.

As far as the communicative preferences are concerned, 84% of the respondents prefer mobile messengers, such as WhatsApp, Telegram, Viber, etc. The most popular mobile messenger in the Republic of Sakha (Yakutia) inter alia is WhatsApp, which is installed in almost every resident's smartphone. Elder people start using smartphones exactly because of the possibility to install this messenger. Some 54% of the respondents choose social networks, namely Vkontakte, Instagram, Facebook, Twitter, Odnoklassniki, while 7% of the respondents use IP-telephony (audio and video calls services, namely Skype and the others). Only 2% of the respondents use email for the communications needs. That proves the statement that modern generation prefers instant messaging.

Talking about the information security resources, we can claim, that the majority of the respondents, namely 51% of them, get this information at school lessons, while 39% from parents, another 35% from mass media resources, and 12% from communication with friends, 35% of the respondents prefer personal experience. Some 6% of the respondents claimed that they are completely not interested in information security. Such answers mean that common for the whole country information security online classes and Computer Literacy classes at school play the important role in information security understanding formation. The parental ICT competence development has made them more trustworthy for their children in the field of information technologies, in comparison with the five years ago survey results (Gafurova, 2012; Kondakova, 2013). Mass media resources keep influencing the children development in connection with their gradual digitalization.

Some 69% of the respondents have personal pages in social networks with 81% of them posting their real surname and name, while 55% of them posting their photos, and 52% specify the date of birth, 28% specifying their phone number, and 6% specifying their addresses, 5% pointing out their locations. It should be noted out that 41% of the respondents have the private mode switched on, so only the specified people can see the personal information from the page. The results show that children share their personal information very carefully and trust only close people.

According to the results of theoretical analysis and current trends in education development in Russia, the need was identified to train teachers who are able to use such technological and instrumental basis of the digital education as modern information and communication technologies in their professional activities. Its effectiveness in education was proven by the results of the experiment analysis (Barakhsanova et al., 2015).

3. Results

The analysis of students', Master's Degree teachers' and schoolers' survey results shows that digital education is the universal communicative tool, which provides the method of future teachers training with the networking interconnection. The respondents point out that the use of digital education technology forms the following professionally important activities when training future teachers in the region: the communicative one, implying the cloud technology, video conferencing and mailing use, the educational and cognitive one, involving reading of the electronic teaching materials, books, programs, regulatory documents, network press, search for the specific educational information or analysis of the current news, etc.

Special test questions were worked out for two important surveys. Some 200 Master's Degree teachers were involved into the first one. The questionnaire for them consisted of 30 questions from different areas. We did our best to cover all the aspects of the digital technologies use, namely: user's activity, digital technologies and resources use, the general information about the Internet user and e-learning methods. The given survey results made us understand how the Master's Degree teachers used the Internet for the basic disciplines of the Master's curriculum from 2015 to 2018.

The second stage included the survey among the Bachelor students, with the total sampling of 35 people from the different specialties of the Teacher Training Institute of M.K. Ammosov North-Eastern Federal University (NEFU). For this study, the questionnaire was refined, both sociologically and psychologically. The questions that defined the user's activity and its content peculiarities, the idea of the digital education and its risks, digital technologies and resources awareness and also the specific methods and technologies of education, such as: the method for determining emotional perception of e-learning and a number of open questions were included into questionnaire allowing us to make a qualitative analysis of the M.K. Ammosov North-Eastern Federal University (NEFU) students' attitude to the digital education

Owing to such survey method, we managed to define the students' attitude to the digital education technologies and to compare attitude to the digital education of the Bachelors and Master's Degree teachers with the vision of digital education in the higher education institutions. The analysis of the questioning results showed some interesting and unique data, which helped us to compare the specific use and perception of the digital education in Russia and abroad for occupational teacher training for the regional schools.

Analyzing the effectiveness of the digital education implementation, it is necessary to point out some qualitative changes that took place among the Master's Degree teachers, students and pupils. The vast majority of future teachers performed their online test with a great interest. Students and pupils showed their trust to the teachers and groupmates, and presented their pedagogical communication in nonstandard situations ability. A lot of Master's Degree teachers, students and schoolers were eager to improve their knowledge and skills in digital technologies and network resources for education.

3.1. Discussion

The following approaches to the digital education development in the regional education system are distinguished.

At first, the progressive methods of education implementation need some cultural transformation. The university structure has to contribute to the ideas exchange, successful cases defining within and outside the campus, to have them developed and practiced. The whole university activities should be devoted to a student successful personality development. For that reason, as some researchers declare, strict goals and tasks should be defined; corresponding support structures and teachers training for the digital education technologies should be organized; curricula and student assessment system should be reorganized.

Secondly, collaboration is the most important factor in the effective decision development.

One of the main peculiarities of the world class university is the ability to collaborate in the global market. Nowadays, we see the universities cooperation and alliances development, which helps them to obtain vantage point in the global educational market. Despite the wide distribution of online learning technologies and materials, they are still not accessible to everybody. The key problem throughout the world, including Russia, is that not all the population groups have equal Internet access and can be limited in their development possibilities. According to the International Telecommunication Union data, only 47.9% of the world population use Internet. The largest number of people with Internet access is traditionally in the developed countries (81%), in developing countries this number is 40%, in the least developed countries this number is only 15%. In the Russian Federation 59.6% of the population (that is 87.5 million people) have the Internet access.

Thirdly, there is the necessity to develop the processes for the individual skills estimation. The education individualization is the integral part of the process. Personalized learning results assessment gives the opportunity to get a clear understanding of students' needs to acquire some skills and competence. It should be noted that the skills which will be in demand in future include professional and technical, and creative skills and critical thinking and should be of utmost importance for the universities. The same is concerned to the pupils, masters and pensioners.

To teach students and schoolchildren to live in the age of rapidly evolving digital technologies, as well as to understand their own behavior strategy in the digital world, is one of the most difficult challenges for the high school leaders (Tretyakova et al., 2017).

The effectiveness of online, as well as mobile and mixed learning is beyond any doubt.

Online education is the greatest discovery in the area of higher education. While universities compete for each student, educational platforms get millions of students. The results of Class Central survey demonstrated that in 2016 the educational platforms were presented by more than 700 universities, 6850 courses with 58 million students. According to the College Data website, an average university has from 5,000 to 15,000-20,000 students, while the educational platform Coursera has 23 million students, EdX – 10 million students, XuetangX (the first non-English platform, entered the top 5 of the leading MOOC in the world) has 6 million students, FutureLearn has 5.3 million students and Udacity has 4 million students.

The key factor of the university success is the availability of such leading technologies as online learning, mixed and mobile education. If the university has no effective strategy as to integration of these approaches, we can say that such university has no future. At the same time, it is necessary to monitor the influence of the educational technologies on the learning results. This may indicate their effectiveness in particular situation.

4. Conclusions

Firstly, the practical skills for the digital educational technologies implementation are of great importance in the process of the digital education. Secondly, with online education implementation, the mediated links are observed, meaning that the range of interaction increases all the time. Hence, online interaction is a system of relations that presents for the professional community and society as a whole the innovative models of educational content, economics of education, digital education system management and educational policy, developing, testing in the republic of Sakha (Yakutia).

The research is of practical and theoretical value, since it proves pedagogical potential of e-learning when training the future teachers; a high level of the students' motivation is confirmed in terms of digital education content and methods in the Arctic Zone of the Russian Federation (AZRF).

The further research may be connected with the digital education programming by the teachers of the Arctic Zone.

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