

Online Educational Resources for Students and Digital Barrier

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Abstract – The purpose of the research is to highlight possibilities and prospects of student' use of Internet encyclopedias, massive open online courses and interactive platforms. The concept of the digital barrier is comprehensively revealed and the factors that influence it are considered. The article is addressed to teachers and specialists involved in the development of educational online platforms, as well as to all those interested in modern online education trends.

Keywords – internet, online resources, education, digital barrier, information society, mass educational online courses

DOI: 10.18421/TEM91-51

<https://dx.doi.org/10.18421/TEM91-51>

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Received: 15 December 2019.

Revised: 05 February 2020.

Accepted: 12 February 2020.

Published: 28 February 2020.

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1. Introduction

Education, along with healthcare, is one of the most socially significant sectors. Therefore, using advanced digital technologies is of primary importance.

Access to the latest online educational programs is one of the factors that determine a person's social status and help improve his social position [1].

According to the "Strategy for the development of the information technology industry in the Russian Federation for 2014-2020 and through 2025", e-learning, massive open online courses and virtual learning environments are those innovations that are introduced into the educational process based on foreign experience which should contribute to improving the quality of education. With this regard, the development of Russian platforms for online education, as well as the inclusion of Russian-language courses in foreign educational online platforms are of high priority [2].

The progress in the field of information technology in recent years requires a review of the traditional teaching methods and determines the expansion of the use of online resources in the educational process. First of all, this review applies to higher educational institutions as the most important stage in getting major by young people and their subsequent competitiveness on the labor market. The introduction of Internet technologies helps to qualitatively modernize education and bring it closer to the advanced standards of modern society in the context of global information system development.

2. Literature Review

Bondarenko was one of the first in the Russian Federation who raised the issue of digital inequality in 2001, considering this problem in the context of the formation of the information society [3]. Later it was investigated by O. Maksimova [4], D. Dobrinskaya and T. Martynenko [1]. The use of e-resources in the educational process over the past decade was investigated by A. Akulov and K. Knyazev [5], I. Norenkov [6], N. Shevko and E. Turutina [7] and other scientists.

Special attention should be paid to the work of European experts in various fields who comprehensively investigated the problem of digital barrier. So, a general statistical analysis of the factors of this phenomenon was carried out by the economists L. Várallyai, M. Herdon and Sz. Botos from the University of Debrecen (Hungary) and other scientists [8]. British scientists L. Philip, C. Cottrill, J. Farrington, F. Williams, F. Ashmore conducted a research of the digital barrier in rural Britain [9]. If we take African countries, the phenomenon was studied by a team of researchers from the Nova University of Lisbon (Portugal) [10].

Among the American researchers, the digital barrier in Florida educational institutions was examined by T. Hohlfeld, A. Ritzhaupt, C. Dawson, and M. Wilson based on data of students using various devices and software [11]. A team of authors from the University of São Paulo traced the dynamics of the phenomenon in Brazil, as well as the role of its various factors in this process [12]. The effectiveness of using online resources in teaching students was studied by the scientists W. Money and B. Dean from the United States [13].

The matter of using massive open online courses in the educational process has been developed in the writings of a team of researchers from Sun Yat-sen University (Guangzhou, China) [14], as well as a number of scientists from Australia [15], Malaysia and Saudi Arabia [16]. The use of game approaches in the educational process, in particular, was examined by researchers from Portugal [17], Brazil and South Korea [18].

The article presents statistics on Internet use in Russia and visits to various educational websites collected by GfK Group [19], [20], Mediascope [21] and Alexa Internet, as well as data collected for presentation in the public domain by other Internet portals. [22], [23].

3. Methods

The research was conducted by analyzing domestic and foreign publications, as well as synthesizing sources (including those of a statistical nature) with

the goal of a detailed versatile description of educational Internet resources and the digital barrier phenomenon in the Russian Federation.

The methodological foundation of the research was the general scientific principle of complexity, systematicity and objectivity. They are implemented through the use of a number of methods, which include statistical methods, comparative analysis, synthesis, and scientific abstraction. In particular, the author made a comparison of statistical indicators characterizing the number of Internet users in recent years in Russia and abroad (including, in the context of various age population groups), the share of mobile audience and “desktop audience”, and also monitored the dynamics changes in these indicators. Moreover, we ran a comparative analysis of the attendance of popular educational websites, which made it possible to assess the current state of this category of online resources and identify prospects for their further development.

Applying the above methods, along with the use of a comprehensive approach, made it possible to present the material in a consistent form and clearly formulate the results of the research. The condition and prospects of various categories of Internet websites intended for distance learning are widely studied, and examples of their successful use by Russian youth for educational purposes are also cited.

4. Results

4.1. *The Digital Barrier and Growth of the Internet Among Russian Youth*

The digital barrier is the phenomenon of a gap between individuals, households, enterprises or regions that are at different social and economic levels, taking into account their access to information and communication technologies and the use of the Internet in various fields of activity [24]. In other words, the digital barrier is a phenomenon of the dependence of an individual's success on his involvement in the information revolution process [3].

The term “digital barrier” was introduced in the mid-1990s in the United States in order to draw attention to the existing gap in access to the global information network and information services. The main factor was the difference in income levels, which did not allow low-income families to purchase the necessary computer equipment and software [25].

The digital barrier is a serious obstacle in the process of establishing the information society in which each individual can create, access, use and share knowledge [10]. Modern researchers distinguish three levels of the digital barrier: the

availability of material resources and access to technology (first level), skills of using information technology (second level), as well as the life chances and opportunities that the Internet gives (third level) [1]. Accordingly, there are three levels of factors that affect the digital barrier: the social level (political and economic factors), the community level (cultural and social factors), and the individual level (personal factors) [11].

The main factors that determine the presence or absence of a digital barrier of the first level are the availability of the necessary infrastructure (desk phone, mobile phone, Wi-Fi) and investment in infrastructure, a targeted state policy in the field of information system technology, as well as a privileged social and economic situation, i.e. income and per capita GDP, a high level of which affects the reduction of the digital barrier. As a rule, the urban population is in a better position, which has access to high-quality services and fast Internet at a lower price, since the prices of service providers for installing the necessary equipment are reduced with an increase in population density in cities.

The skills to use information technologies, which generate the second level of the digital barrier, largely depend on literacy, age, experience working with computer and mobile equipment, as well as psychological factors. In families with children or youth, the older generation is more likely to use information technology, adopting the necessary skills from them. Culture plays an important role in this, as individuals belonging to different cultures can perceive information technologies in different ways [8]. On the other hand, gender, marital status and ethnic origin, in our opinion, are secondary factors.

The third level of the digital barrier is most affected by such factors as education and profession (people with higher education, knowledge of English, as well as researchers, are more likely to access and use information and communication technologies) [8].

There has been a trend of an annual increase in Internet users, primarily due to representatives of the older generation in the Russian Federation in recent years (Fig.1.).

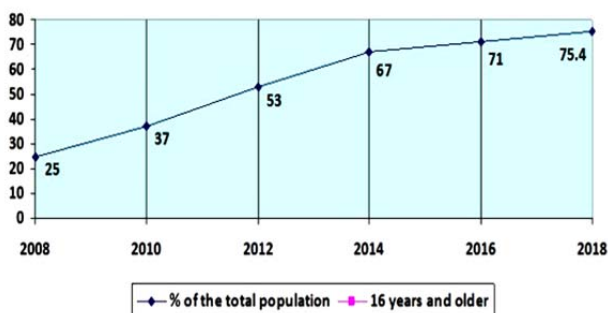


Figure 1. Number of Internet users in the Russian Federation (2008 –2018) [20]

According to the latest foreign statistics, the total Internet coverage of the population of Russia is 76.1%, which is almost 110 million people and 15.2% of the total number of Internet users in Europe. This indicator is significantly higher than the global average (57.3%), but lower than the average European level (86.8%) [22].

As for young people aged 16-29, the number of Internet users in this category has almost reached the limit and amounts to 99%. For comparison, 88% of middle-aged people (30-54 years old) now use the Internet, and among people of the older generation (55 years old and older) this figure reaches only 36% [20].

First of all, the growth of the Internet is associated with the massive use of smartphones and tablets, as well as the availability of wireless Internet access, mobile communications and mobile Internet, which is now used by 73 million Russians - 61% of the total population over 16 years old [20]. This indicator is growing rapidly, with the latest dynamics of 5-10% per year [19]. Therefore, as of 2018, the mobile audience is 61%, and the trend was growing 9% per year. At the same time, the number of the so-called “desktop audience” (PC and laptop users) was 51%, who tend to decrease by 2% per year [21]. At the same time, the main mobile traffic goes through Wi-Fi (70% of the traffic); mobile Internet accounts for 30% of the traffic [21].

It’s important that the percentage of the younger generation (16-29 years old) using only mobile Internet is 41%, which is a higher indicator than middle-aged people (30%) and significantly higher than the index of the category of older Internet users generation (9%) [20].

4.2. Overview of Online Resources, Popular Among Students

Next, let’s consider the popular online educational resources used by students both in the process of studying a university program and during off-hour self-study.

The free Internet encyclopedia, **Wikipedia**, is traditionally the most popular educational online resource among students, allowing you to quickly find the necessary minimum information from various fields of knowledge to get ready for classes, without studying supplementary literature. Based on the fact that due to the free access to Wikipedia editing, the quality of a significant part of its articles remains quite low (insufficient completeness of the text, poor structure of the material, frequent factual errors or lack of sources), this approach simplifies the perception of new knowledge to an extreme degree and can sometimes lead to misinformation.

At the same time, some Wikipedia articles are well written and supported by a sufficient number of

sources (first of all, these are the categories “Selected articles” and “Good articles”). In our opinion, it may be useful practice to involve students in writing articles in the Internet encyclopedia as an independent work in the process of studying certain theoretical disciplines at a university, which in the future can positively affect the quality and content of this online resource.

One of the most common forms of online learning today is **massive open online courses (MOOCs)**. The advantages of such a modern supplementation to the learning environment are accessibility and openness for an unlimited number of students [16]. MOOCs allow teachers to run courses to a significantly larger audience than during the traditional learning process, and can also provide continuing education [17].

At the present stage, MOOCs as a rule include not only electronic versions of textbooks or videos of lectures by leading university teachers, but also multiple-choice test items. This format of courses allows you to check the success of students in automatic mode and makes it possible to distance learning not only for students of a particular higher educational institution, but also for everyone. Universities such as Moscow State University, St. Petersburg State University, the Russian Presidential Academy of National Economy and Public Administration, Moscow Institute of Physics and Technology and the Higher School of Economics hold the championship in cooperation with online educational platforms [26].

The most famous Russian MOOCs that offer users academic video lectures and online courses in various fields of knowledge are the Universarium, Uniweb, and the National Open University INTUIT and others.

One of the most popular domestic MOOCs is the educational project Lectorium, which has been operating since 2009. Being both a platform for hosting MOOCs, a publishing house for their development, and the largest open Russian-language archive of video lectures (over 5000), the resource collaborates with the Ministry of Education and Science of the Russian Federation, leading Russian and foreign universities, as well as organizations and companies interested in supporting educational initiatives. This project is especially famous for its many courses in the field of computer science, which make up a significant part of all educational material presented on the website.

Currently, encyclopedic and lecture materials are no longer sufficient to meet the needs of youth in high-quality and interesting educational content. In this regard, educational websites are gaining wide popularity, a characteristic feature of which is an

accessible and more original form of presentation, as well as a high level of interactivity.

One of the most popular educational websites among students is the **Arzamas** website, founded in 2015. First of all, it is aimed at educating students of humanitarian specialties and contains materials from such disciplines as the history of Russia, world history, art, literature, anthropology and philosophy. The website hosts online courses and the so-called "educational program", consisting of audio and video lectures, animated videos, related materials and fixing tests. Moreover, the mobile audio application “Arzamas Radio” is available for users, which makes listening to lectures, podcasts and other materials in a convenient way.

The **PostNauka** project created in 2012 positions itself as an online journal about modern fundamental science. It is based on ten-minute video lectures on the latest achievements of science, modern technologies, theories, ideas and concepts, read for first person by experts in different fields of knowledge. The website also hosts interviews with scientists, various articles and fragments of relevant research. The PostNauka website is aimed at a very wide audience and is not exclusively a youth project, but it is also quite in demand among students.

Another well-known popular science project aimed at youth is the publication **N+1**. It is built according to the format of the online version of the modern glossy magazine; the website offers readers the latest science and technology innovations, filed in a non-standard and visually attractive form, which allows them to adapt materials for social networks. A distinctive feature of the resource is an indication of the complexity of the perception of materials scale 1 to 10, which makes it possible to assess the level of efforts of the authors involved in writing a specific article. According to the editors of the website, these efforts are directly related to the efforts required by readers to understand the material. Of special interest is the “Scientific Closures” section, which contains the latest refutations of previously known theories, as well as scientific facts that are not confirmed by modern research.

Based on the latest data from the established company Alexa Internet, we will analyze the main statistical indicators characterizing the popularity of the educational online resources discussed above. Due to the fact that the statistics of Wikipedia attendance, presented by the company in the public domain, is generalized across all versions of the website in different languages, it is not possible to compare the attendance of its Russian-language section with similar indicators of other websites. At the same time, it is obvious that the positions of the free online encyclopedia in the Alexa global ranking are very high.

Table 1. Visits of popular educational websites according to Alexa Internet [27] (as of October 13, 2019)

| | Position in the global ranking of Alexa | Position in the ranking of Alexa in Russia | Russia's share in total traffic | Average daily stay on website |
|------------------|---|--|---------------------------------|-------------------------------|
| Wikipedia | 9 | no data | no data | 3 min 56 sec |
| Arzamas | 23634 | 1662 | 44.8% | 2 min 50 sec |
| PostNauka | 41929 | 1836 | 60% | 2 min 25 sec |
| N+1 | 54805 | 3658 | 54.9% | 2 min 33 sec |
| Lectorium | 78091 | 4061 | 74.5% | 7 min 42 sec |

The above statistics show that the most popular among the Russian educational websites we examined is Arzamas, while also showing a very high level of visiting by foreign users (55.2%, which makes up more than half of all website traffic). At the same time, Lectorium is popular, first of all, precisely among users from the Russian Federation; but in general, it is in the ranking much lower than other educational resources. In our opinion, the average daily time spent on the website is directly related to the format of the resource and its target orientation: these indicators are the smallest and approximately the same for websites focused primarily on the popularization of science among young people in an accessible and entertaining way.

The performance potential for the development of educational online technologies is far from exhausted. The operational tracking of changes occurring in various fields of knowledge is of great importance [6]. The use of multimedia technologies in education helps not only to effectively present information, but also allows you to attract attention and interest users, while acting on the most important human senses such as vision and hearing [7]. Besides searching information and its further visualization for the convenience of the user, one of the main tasks for today is the creation of such resources that will be able to better adapt to the individual needs of students and better meet the goals of their training [6]. In particular, further gamification, which is the introduction of elements of game functions in the educational process can contribute to increasing the motivation and interest of students [28]. Therefore, modern online resources can improve learning activities, providing students with a wide range of opportunities for practical training or certification of knowledge [7].

An important characteristic of modern online projects in the field of education is that besides the main website, they are widely published in social networks such as VKontakte, Facebook and Instagram, as well as on YouTube video hosting. Such a trip makes it possible to attract a wider youth audience and contributes to the increasing popularity of educational resources among students as the most involved social group and the most susceptible to innovation social group.

5. Discussion and Conclusion

The latest statistics clearly show that the digital barrier of the first level in the Russian youth environment is almost absent. In the context of the ubiquitousness of mobile and wireless Internet (this is especially noticeable in large cities, where the vast majority of students are focused), it makes sense to talk about the formation of a "digital generation" - a generation of modern youth whose lifestyle and identity are formed in a fundamentally new environment, which is extremely important the role in which belongs to social networks [4].

The total Internet coverage in the Russian Federation is approximately at the level of countries such as Belarus (74.4%), Moldova (76.1%) and Northern Macedonia (76.3%), while in the UK this figure is 94.6% [22], while in the USA the figure was 95.6% [23]. However, according to our statistics, the potential for serious growth in the Russian Internet audience remains mainly for the older generation. At the same time, problems with unequal access to the Internet among younger categories of the population can still arise among the rural population and to one extent or another this applies not only to Russia, but also to other developed countries [9].

Based on the fact that there is practically no digital barrier among modern Russian students, the potential for using educational Internet resources among the younger generation is quite high. It must be mentioned that the niche of educational online projects for students at the moment is only partially filled. The forecast for its further development is positive, which is associated with a number of factors. In particular, the massive popularity of social networks among students can be used to promote educational websites, adapting to an interactive or entertaining format for presenting information, which is currently most interesting for the average user. The use of smartphones by young people to access to the Internet is already surpassing the use of PCs, so it makes sense for developers of educational websites to reorient themselves towards creating multi-platform projects and mobile applications that can provide faster access and solve a wider range of tasks than regular websites.

The results of this study can be used in the development of educational resources, as well as curricula and programs in the development of education and information technologies in the Russian Federation.

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