

Innovations of internet resources under digitalization of the educational process

Raisa Bazaliy^{1,*}

¹Don State Technical University, Gagarin sq., 1, Rostov on Don, 344003, Russia

Abstract. The author of this article analyzes Internet resources that are designed to improve the online education efficiency in the context of spreading of the coronavirus infection. The article considers the problems of using new technical and information tools of the global information and educational environment to improve the quality of traditional and e-learning. The emphasis is placed on defining educational content on the Internet that develops the cognitive and professional interests of students of technical and humanitarian major subjects. The article specifies the audience of virtual space users who has participated in the experiment for four years, summarizes comparisons of quantitative indicators of the content of cognitive resources, and presents the results and conclusions of the study. The main research methods were the analysis of scientific literature, generalization of features of educational content on the Internet, questionnaire polls, testing, and performance of tasks in the modern information space.

1 Introduction

In modern conditions, students of the don state technical university have been transferred to distance learning due to the spread of COVID-19 (coronavirus infection), in connection with this, in recent months, the requirements for methodological training of the University's teaching staff have changed, and the need for the development of innovative digital technologies has been updated. Modern educational process in the conditions of informational support offers students a wide range of training and acquisition of universal competencies, using the global information resources. The aim of the research is to identify educational content on the Internet that develops the cognitive and professional interests of students of technical and humanitarian specialties of the University. New media and information technologies, training methods, special courses, social networks based on interests, practical online games increase the efficiency of the distance learning process in the educational and professional activities of bachelors.

The solution of problems related to study Russian and foreign experience of using Internet resources and ICT in distance education is essential for the educational process in contexts of digitalization as well as how students use Internet and mobile technologies, identification of opportunities of modern communication technologies for successful implementation in a continuous process of learning. Taking into account the requirements

* Corresponding author: rv7bazalii@mail.ru

of high-quality training of specialists of the technical University, an experiment was started in 2016 on the basis of the Department "Theory and methods of professional education". Over the course of four years of bachelor's training, available opportunities of the Internet, their mobile adaptations to improve the effectiveness of traditional and distance education, the development of professional skills of students were studied, their impact on electronic forms and means of education was determined, taking into account multimedia challenges, psychological and pedagogical preferences of users.

Many studies of foreign scientists are devoted to distance education. In their scientific works, R. Garrison, D. Keegan, O. Peters, B. Holmberg justified the historical reasons for the implementation of online education at a distance, revealed the basics of learning, and structured models for organizing e-learning.

O. Peters noted in his concept that in distance learning, teaching and creating educational materials are carried out by different subjects of the educational process. The scientist believed that to meet the social order of increasing the number of highly qualified specialists would help distance education, focused on a wide audience with its indifference to time and space frames. According to the researcher, providing the working population with a wide range of educational opportunities will help formalization of educational material, automation of training, standardization of behavioral responses of educational subjects. The concept of the scientist does not sufficiently disclose the pedagogical component of distance education: individual creative development of students, psychological and pedagogical support.

F. Saba noted that the communicative environment that is created with the help of modern ICTs does not mean the appearance of interaction between the subjects of the remote educational process. It is important to overcome the audio-visual barrier between the teacher and the student, and strive for a mutual dialogue [1]. K. Aoki offers a new organizational structure for distance education [2]. Foreign scientific literature studies the problems of development of information and communication technologies, Internet resources in the works of B. Boles, H. Mehraj, A. Gary, G. Miller, I. Yengin, A. Karahoca, D. Karahoca, H. Uzunboylyu [3-6]. D. Senashenko, M. Senashenko, G. Samigulina. Z. Samigulina analyze the types of distance education in international corporations, offer forms of high-quality training of specialists in technical and humanitarian areas [7,8].

In the discourse of usage of information and communication technologies as a way to improve the quality of education, the works of scientists were considered A. Durmusa, S. Kaya, Y. Shi, M. Wang, Z. Qiao, L. Mao, A. Sims [9-12]. The analysis of sources [13-19] shows the need to expand the ways of implementing information and communication technologies in the learning process, as well as to create conditions that will increase the efficiency of training bachelors to use educational content on the Internet.

2 Materials and Methods

The following methods were used in the preparation and conduction of the problem-searching, theoretical-analytical, control-effective stages of the experiment: the study of scientific literature, multimedia foreign and domestic experience, comparative analysis of the usage of information educational content on the Internet for distance learning. Diagnostics of students in technical and humanitarian specialties was carried out: the possibilities of Internet technologies in the activities of students, their needs and interests in the conditions of digitalization of the educational process were studied. We used testing, questionnaire polls, practical tasks, and analysis of the results of students' activities in traditional and distance learning. On basis of a system-integrated approach to the

transformation of educational and professional activities of students, data on the research problem were compared.

In our experiment, 206 students of don state technical University participated: 119 of them are bachelors of technical specialties and 87 – of humanities, who not only communicate in social networks and messengers, play online games with friends, but also successfully master Internet professions, making living with the help of modern technologies. Since 2016 and in subsequent academic years, each course has been taught technical and pedagogical subjects which were included in the experimental program, with the introduction of learning educational content on the Internet in experimental groups. In the control groups of bachelors of technical and humanitarian specialties, the teaching of humanitarian and technical disciplines was carried out traditionally. In 2020, the results were analyzed and corrective actions were identified to improve the efficiency of using information and educational space with the use of distance learning technologies.

3 Results and discussion

Problem-search stage of the research. At this stage, the ways of innovative search for the educational content developed in a pilot programme to explore the information space were defined and pedagogical conditions of active introduction of the Internet usage for educational and professional activity of students in distance education were justified. Innovative Internet technologies increase the information and communication culture of students, providing flexibility in the management of participants in the educational process, increasing self-control and motivation of students. In the process of distance learning, it is not always possible to change the quality of control by means of activities for students. Developing information and communication culture through the study of Internet resources, 63 students of technical and 54 students of Humanities majors of the 1-2nd courses in the course of the survey noted the following reasons for their reluctance to actively meet their cognitive needs in the global information system (table.1). Data is given as a percentage.

Table 1. Reasons for insufficient use of the Internet by students

	technicalspeciality	humanitiesmajors
1. Do not know about these features	17	14
2. They are afraid to be engaged in self-development	23	21
3. Do not want to get an education with the help of modern technologies	48	56
4. Additional education is not valued in educational institutions	12	9

The survey of students revealed that their reluctance to show diligence and conscientious attitude to the process of obtaining knowledge and skills on the Internet is due to the fact that currently online learning does not encourage everyone to take active action, despite the fact that many learn to use smartphones from an early age.

Based on the results of processing the responses to the survey questions related to the study of the information space, analysis of the information received on electronic educational platforms, understanding and remembering the key moments of the information media sphere, implementation of educational projects, the process of creating new knowledge and new information, experimental groups of 25 students of technical and humanitarian specialties were formed. In the course of the survey, respondents indicated the social network platforms used, information and communication tools for fundraising, and explained the need to use web and online communications in educational activities. Most bachelor's degrees in technical and humanities are considered to be effective

communication tools: information via email, official websites, social networks, video content, and text messages.

As part of the study, 56 students of technical and 33 students of Humanities majors of the 3-4th courses were tested, which revealed the presence of a stable motivation that increases the effectiveness of traditional and distance learning using Internet resources. An internal impulse pushes students to finish what they have started, actively searching for additional information resources, articles and notes during training.

Theoretical and analytical stage of the research. Based on a system-integrated approach aimed at analyzing the information and multimedia situation in higher professional education, Internet resources were formulated to improve the effectiveness of the educational process. In our study, bachelors of experimental groups of technical and humanitarian specialties analyzed popular self-education sites and portals that can improve the effectiveness of traditional and distance learning. Students drew attention to the educational platform "Coursera", which cooperates with more than 190 leading universities in the world, currently educating more than 45 million people. Respondents noted the advantages of this resource, distance education programs, using the Internet (table.2). Data is given as a percentage.

Table 2. Advantages of the Coursera educational platform

	Technical speciality	Humanities majors
1. Information for users of different ages and interests, classes using a personal computer, laptop, smartphone and tablet	24	21
2. courses for school children: - psychological and pedagogical aspects and interests; -development of applications and proprietary technical programs	15	19
3. Senior audience: - interesting programs to suit everyone's tastes; - training on the official website of the Internet resource for professional development; - career advantages: promotion, salary growth, getting a new position	47	49
4. user's choice of training options: -free courses; - higher education at an affordable price; - free access to paid courses for the duration of the coronavirus pandemic «Coursera»	14	11

The study showed that students of experimental groups could be engaged in self-education at home, planning their own convenient pace of passing the stages of training in online mode. Bachelors noted the possibility of developing skills with advanced studying. Respondents complete test tasks, practical projects, and receive feedback about their creative activities from students worldwide. Those who successfully complete the training course receive branded documents that confirm their qualifications.

Control and performance stage. At this stage, we systematized the results of experimental research on the organization of traditional and distance learning formats using educational content on the Internet, their understanding and generalization, taking into account the results of research at previous stages of studying the world information space.

Students of the experimental group of 4 courses of technical specialties rated the online University of popular professions "Skillbox", which is popular among young people, according to the following indicators:

1. Consideration of modern professions in the following areas: programming, design, marketing and management. These specialties are interesting to the younger generation;
2. Effectiveness of education on this resource:
 - suggested programs: the duration of training is more than one year;
 - collecting a portfolio, preparing a resume and guarantee to find a job in the course of training.
3. Systematic approach to education:
 - video lectures and practices;
 - consultations and theses;
 - employment assistance to improve their professional skills.
4. There are weekly free classes and lectures. Those who so desire can learn the basics in the presented directions.
5. Specialists are valued in marketing branding of companies, PR agencies and SMM agencies, freelance work.

Bachelors of the experimental group of Humanities majors of 4 courses performed a task related to the analysis of the free educational project "Arzamas". Students noted online courses that combined video lectures, reference notes and articles, photo galleries and newsreel fragments, quotes from forgotten books and interviews with specialists. In various ways, it tells a story of literature, art, history, and other Humanities. Students noted the following types of projects used for users:

1. Courses – "humanitarian series", starring the best scientists. Respondents noted not only audio and video lectures presented to the audience, but also accompanying materials: newsreels and photo galleries, tests and games, interviews with creative people from different fields of activity, and lists of literature.
2. A magazine which publishes interesting materials about history of culture. The majority of respondents' attention was drawn to topics related to answering questions, such as: what does Petersburg of Silver age smell like? What did ancient people write and draw on the walls? The magazine for self-education of users offers daily reading of cheat sheets, recommendations, reviews, instructions, anthologies, monologues of specialists.
3. Special projects: administrators of the Internet resource periodically invent a special highlight for their audience. Students evaluated projects for children, video tutorials and educational Internet games, online representations of the best museums and universities in the world.
4. Educational Programs: in specially prepared videos, a student is informed about the most important things, then he/she listens to audio lectures, a user is further immersed in the topic being studied and performs a verification test, fixing the material passed.
5. Radio Arzamas is convenient for users to organize the educational process: all lectures, recorded audio versions of texts are stored in a specially designed mobile app. A modern person has a smartphone or phone nearby, so the user determines the time convenient for him to study the necessary material.
6. Events: students can get acquainted with the upcoming events planned on the Internet resource in advance. Respondents were attracted by lectures, evenings, concerts, and quests created by the project. According to the majority of bachelors, events held in parks and at old railway stations, in cinemas and libraries, and in various cities from Kaliningrad to Yuzhno-Sakhalinsk are no less interesting for users than the online version.

The study showed that the presented types of project "Arzamas" help students better understand the course topic. For the General development of a well-mannered and educated

person, administrators invite leading experts with topics from different spheres of public life to events in offline mode, courses and magazines in online mode.

Conducting group conversations with 4-year students, they discussed modern methods and approaches of distance learning that help bachelors find and learn the necessary information independently. Bachelors of technical and humanitarian specialties analyzed the training information of the St. Petersburg non-profit academic educational project "Lectorium", which motivates for continuous training and helps to develop independently throughout their lives. Respondents indicated the following factors of popularity of this project (table.3). Data is given as a percentage.

Table 3. Factors of popularity of the educational project "Lectorium"

	Technical speciality	Humanities majors
1. Large video archive of academic lectures in Russian	24	21
2. Educational courses of the new generation	15	19
3. Free access to the library	47	49
4. Online consultations on preparing for the unified state exam	14	11

In our study, a survey of 63 bachelors of technical and humanitarian specialties of the 1st year showed that this Internet resource actively helped high school students prepare for unified state exams, signed up for online consultations on various subjects with teachers of leading educational institutions. Students noted the possibility of using more than 5000 video lectures and 100 online courses for fruitful self-learning in the context of distance education. For example, while studying the romantic course "Petersburg intersections", users take literary video walks around St. Petersburg, learn interesting and informative material about Brodsky and Blok's "city on the Neva", Pushkin's "the Bronze horseman" and Dostoevsky's "little man". The younger generation is attracted by the historically practical course "Theory of money. From shell to bitcoin", "Bionics.Nanomemory". The majority of respondents highlighted the course on probability theory and engineering "Celestial mechanics", which allows not only to gain knowledge about the laws of motion of celestial bodies, but also to move on to the problems of modern physics and cosmology, as well as students noted lectures on programming languages, geometry and databases.

The TV project "ACADEMIA", which was recognized as the best educational TV project of 2011 and is currently available in an online version, improves the effectiveness of the educational process of traditional and distance education. Thanks to the TV project of the channel "Culture, a wide audience of people in each issue of the program studies a lecture on one of the fundamental Sciences. Students of the 4th year noted the following scientists who spoke at the all-Russian television Department: Nobel prize-winning physicist Zh. Alferov, Director of the Institute of Russian history of the Russian Academy of Sciences A. Sakharov, Professor S. Kapitsa, linguist and philosopher V. Ivanov, archaeologist Yanin, biochemist academician Vladimir Skulachev, bioengineer academician Konstantin Scriabin, the Creator of the leading school of protein engineering M. Kirpichnikov. Students of technical specialties noted the speech of D. meadows, a well-known American scientist in the field of global modeling, environmental management and environmental protection. Respondents are attracted by the format of this TV show, the atmosphere is typical of the educational institution and the opportunity for students to communicate with the lecturer is realized. Well-known scientists, addressing a wide audience, do not only attract attention to science and expand the circle of people who love lectures with fewer interactive additions and popular science articles, but also develop additional motivation for education using Internet technologies.

In our study, students who lead a healthy lifestyle identified an online resource "EDX", which combines video lectures, reading and independent tasks and does not restrict the user

in topics and areas of knowledge. Modern youth noted popular courses of this resource, such as " Introduction to cloud technologies", " Introduction to steel", " Creative problem solving and decision-making", " Science and cooking", "Nutrition and health". However, this resource can be used by users who are fluent in English or want to adjust their level of language proficiency, since "EDX" is not yet adapted for the audience of our country. According to the students, training on this educational resource and obtaining a certificate will help to improve the existing related qualifications and be successfully implemented in future employment.

Modern students like traveling, and many strive to be fluent in business communications in foreign languages, so in our study we analyzed the mobile application "Duolingo" for learning the language in a playful way. Users are given the opportunity to learn English and German; in the further preparation process-Spanish, Swedish and French. Bachelors of experimental groups of 4 courses noted that the educational process is an informative and exciting game, respondents are attracted by modernity, intuitive simplicity and ease in understanding the mechanisms of work.

4 Conclusion

The experiment showed that at the present stage of development of distance education, the intensity of usage innovative digital technologies by students of technical and humanitarian specialties of DSTU has increased, which are focused on the development of students ' cognitive and professional interests.

The results of the study of modern trends in learning in the digital environment of distance education have shown the effectiveness of using active forms of educational content on the Internet. The introduction of information and multimedia technologies optimizes the process of students ' development of significant disciplines, develops creative abilities of the individual. The study revealed that online interaction between e-learning subjects had become an integral part of the educational process and provided golden opportunities for improving the efficiency of traditional and distance education.

References

1. F. Saba, *Educational Technology*, 51-6 (2011)
2. K. Aoki, *Procedia - Social and Behavioral Sciences* **55**, 1183 – 1187 (2012) doi.org/10.1016/j.sbspro.2012.09.613
3. B. Boles, *Columbia Social Work Review*, **4**, 69-79 (2013) doi: 10.7916/D88P5Z1B
4. H. Mehraj, A. Bhat, *Impacts of Media on Society: A Sociological Perspective. International Journal of Humanities and Social Science Invention*, **3**, 56–64 (2014)
5. L. Pushkareva, *Economic Security Issues SSRN Electronic Journal* (2019) doi: 10.2139/ssrn.3505157
6. G. Miller, *American Inter Continental University Online* (2014)
7. D. Senashenko, M. Senashenko, *RUDN Journal of Informatization of Education*, **14(1)**, 42-48 (2017)
8. G. Samigulina, Z. Samigulina, *Procedia - Social and Behavioral Sciences*, **228**, 229 – 236 (2016) doi: 10.1016/j.sbspro.2016.07.034
9. D. Alpaslan, K. Sinan, *Procedia - Social and Behavioral Sciences* **28**, 661 – 666 (2011) doi: 10.1016/j.sbspro.2011.11.125

10. Yengin Shi et al, *Procedia Computer Science* **3**, 1388–1395 (2011) doi: 10.1016/j.procs.2011.01.020
11. Yaqing Shi et al, *Procedia Engineering* **15**, 4295 – 4299 (2011) doi: 10.1016/j.proeng.2011.08.806
12. A. Sims, ek et al, *Procedia Social and Behavioral Sciences* **9**, 324–328 (2010) doi: /10.1016/j.sbspro.2010.12.158
13. R. D. Costa, The theory of learning styles applied to distance learning, **64**, 134-145 (2020) doi.org/10.1016/j.cogsys.2020.08.004
14. D. An, M. Carr, Learning styles theory fails to explain learning and achievement: Recommendations for alternative approaches, **116**, 410- 416 (2017) doi.org/10.1016/j.paid.2017.04.050
15. B. B.de Koning, Effects of spatial distance on the effectiveness of mental and physical integration strategies, **110**, 106379 (2020) doi: 10.1016/j.chb.2020.106379
16. M. Amata Garito, *Procedia - Social and Behavioral Sciences* **93**, 1749 – 1754 (2013) doi: 10.1016/j.sbspro.2013.10.110
17. T. Tavukcu et al, *Procedia Social and Behavioral Sciences* **15**, 3999–4004 (2011) doi: 10.1016/j.sbspro.2011.04.404
18. H. Ilgaz, P. Aşkar, *Procedia - Social and Behavioral Sciences* **106**, 2671 – 2680 (2013) doi:10.1016/j.sbspro.2013.12.308
19. S. Caliskan et al, *Procedia Computer Science* **120**, 529–538 (2017) doi.org/10.1016/j.procs.2017.11.275