



Digital Transformation of the Russian Historical Education: Regional Aspect

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Abstract

The modern Russian education system is on the path of digital modernization, which is accompanied by a paradigm shift in the choice of models of educational institutions, approaches to the management of the educational process, modification of learning conditions, innovations within the methodological arsenal of teachers, modern digital technologies are being introduced. Digital transformation or digitalization of education, along with computerization, individualization, etc., is one of the key trends in the development of the education sector. Undoubtedly, for the successful digital transformation of the educational system Russia needs to solve many tasks, both global (logistics, upgrading professional competencies, stimulating the development of educational IT technologies, etc.) and local. Among the local, but no less significant, tasks is the search for digital learning tools that can improve the effectiveness of the educational environment. It is necessary to answer the question: how is it possible to train qualified specialists basing on digital educational tools? In this article, the authors consider the use of machine learning technology in successful educational practices, as well as highlight “digital products” tested by teachers of the Department of History of Astrakhan State University. Digital transformation of education is considered by the authors of the article in relation to the economic development of the country, The Caspian region and the Astrakhan region, which characterizes the features of the “state order” in the educational sphere.

Keywords

Digital Transformation of Education; “Digital Economy”; Digitalization; Digital Tools; Digital Learning Tools; Machine Learning; Chat-Bot; Visualization Using Neural Network; Moodle



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Цифровая трансформация российского исторического образования: региональный аспект

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Аннотация

Современная система образования России стоит на пути цифровой модернизации, которая сопровождается сменой парадигм в выборе моделей деятельности образовательных учреждений, подходов к управлению образовательным процессом, меняются условия обучения, появляются новации в методическом арсенале преподавателей, внедряются современные цифровые технологии. Цифровая трансформация или цифровизация образования, наряду с компьютеризацией, индивидуализацией и др., входит в число ключевых тенденций развития сферы образования. Несомненно, для успешной цифровой трансформации образовательной системы России требуется решение многих задач, как глобальных (материально-техническое обеспечение, апгрейд профессиональных компетенций, стимулирование развития образовательных IT-технологий и т.д.), так и локальных. К числу локальных, но не менее значимых, задач относится поиск цифровых средств обучения, способных повысить эффективность образовательной среды. Необходимо ответить на вопрос: каким образом возможно осуществлять подготовку квалифицированных специалистов, опираясь на инструменты цифрового образования? В данной статье авторами рассматривается использование технологии машинного обучения в успешных образовательных практиках, а также освещаются «цифровые продукты», апробированные преподавателями исторического факультета Астраханского государственного университета. Цифровая трансформация образования рассматривается авторами во взаимосвязи с экономическим развитием страны, Каспийского региона и Астраханской области, что характеризует особенности «государственного заказа» в образовательной сфере.

Ключевые слова

цифровая трансформация образования; «цифровая экономика»; цифровизация; цифровые инструменты; цифровые инструменты обучения; машинное обучение; чат-бот; визуализация с помощью нейронной сети; Moodle



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The development of digital space in modern Russia

The modern world is undergoing the period of unfolding of the fourth industrial revolution, which is characterized by merging of material production and digital technologies. “Smart Products” are becoming the norm in the world, where intellectual properties computerized devices (robots), therefore the complexes and networks consisting of them acquire the ability to interact independently in the preparation and deployment of automated production processes (Uvarov et al., 2019). Digitalization of all spheres of public life is becoming a priority task of state policy in the world, and its level is a key criterion in the “stratification of states”.

The digitalization of the Russian state takes place within the framework of the implementation of Presidential Decrees No. 204 dated May 7, 2018 “On National Goals and Strategic Objectives of the Development of the Russian Federation for the period up to 2024” (Decree of the President of the Russian Federation of May 7, 2018 No 204 ..., 2018) and No. 474 dated 07/21/2020 “On National Development Goals of the Russian Federation for the period up to 2030” (Decree of the President of the Russian Federation of July 21, 2020 No 474..., 2020). In order to solve the problem of ensuring the accelerated introduction of digital technologies in the economy and social sphere, the Government of the Russian Federation has formed the national program “Digital Economy of the Russian Federation” (Passport of the National Program “Digital Economy of the Russian Federation,” 2019), approved by the minutes of the meeting of the Presidium of the Presidential Council for Strategic Development and National Projects dated June 4, 2019 No. 7.

The development of the “digital economy” is actionable only with the implementation of the digital transformation of Russian education. Therefore, the Federal project “Digital Educational Environment” is currently being implemented in the field of education (Federal Project “Digital Educational Environment,” 2019) (within the framework of the National Project “Education”), aimed at “creating and implementing a digital educational environment in educational organizations, as well as ensuring the implementation of the digital transformation of the education system” (*ibid*). By 2024, it is planned to update the material and technical base of schools on the territory of the Russian Federation, create a federal information and service platform and connect teachers to it, as well as open centers for digital education of children (*ibid*). In relation to higher education, the “Strategy of Digital Transformation of the branch of Science and Higher Education” has been in effect since 2021 (Strategy of Digital Transformation of the Sphere of Science and Higher Education, 2021). It contains project passports that build the conceptual orientation of the digital transformation of higher education and science.

The creation of a digital educational environment is not just an accompanying direction of digitalization, but also one of its engine rooms. Since the education itself influences the economic development of a country, a particular region or municipality, it helps to reduce the level of social differentiation.



The digital transformation of the education system depends on external and internal factors of regional development. Therefore, each subject of the Russian Federation, taking into account the economic resources of the region, builds its own development strategy, including educational sphere.

The Strategy of socio-economic development of the Astrakhan Region for the period up to 2035 (hereinafter referred to as the “Strategy”) aims to develop economic ties with the countries of the Caspian region (On the Strategy of Socio-Economic Development of the Astrakhan Region..., 2020). According to positive plans, it is the Astrakhan Region that should become the centre of “a comfortable socio-cultural space for the development of human capital, public institutions in which human capital is in demand by the economy and can function successfully” (*ibid*). To do this, it is necessary to achieve solutions to problems in the field of the regional education system. Among them we will designate: “insufficient level of technical equipment of educational institutions; low degree of realization of individual trajectories of development of students; insufficient level of introduction of digital technologies of the organization of educational activities and communications in the practice of educational organizations; lagging competencies of teachers from the requirements of the digital economy; inertia of the educational system in relation to the dynamics of the needs of the labour market” (*ibid*).

In this regard, the task of training highly qualified professional personnel (teachers, experts, IT specialists, education managers, methodologists, masters of industrial training, etc.) is actualized. This human resources will be able to search for and introduce effective digital technologies into the digital space of education, contribute to improving the level of education, and, in general, the intensive development of the region's economy.

The implementation of machine learning in educational process

Machine learning is one of the priority directions of artificial intelligence. The basic principle of this technology operation is that machines receiving data are “trained” on the data they are receiving (Flach, 2015). Despite the fact that technology is more widely used in the IT industry, marketing research and advertising business, machine learning is beginning to contribute to the digital transformation of education. There are some examples that illustrate how to solve diverse educational tasks.

In order to implement the state policy in the field of education, an analytical “tool” is needed that will allow building a collaboration of all levels of the educational system with state authorities. Such a digital solution in Russia was the project “Datahab: data management system for science and higher education”. It “is aimed at introducing advanced analytics capabilities, including using machine learning methods to optimize management and decision-making processes” (Strategy of Digital Transformation of the Sphere of Science and Higher Education, 2021).



The implementation of the project will: “simplify the process of data collection and improve their quality for federal executive authorities; optimize resources to reduce the administrative burden for reporting organizations, both scientific and educational; provide seamless business access to the results of scientific research and research datasets; increase transparency of the work of federal executive authorities for citizens; implement management and research services available to a wide range of users on the collected data” (Strategy of Digital Transformation of the Sphere of Science and Higher Education, 2021).

In particular, this digital technology will be able to ensure the fulfilment of the tasks of the regional project of the Astrakhan region “Young Professionals”. These include: “organization and formation of a consolidated order for personnel training in the regional system of professional and higher education; creation of a system for independent assessment of the quality of personnel training in the Astrakhan region” (On the Strategy of Socio-Economic Development of the Astrakhan Region..., 2020).

After analysing the data on the types of economic activity of the region, the number of vacancies at enterprises, innovations in the field of production, the system will identify the range of professions in demand, as well as predict their required number. In addition, based on the analysis of the students' learning process, their acquisition of professional competencies, assessment of the level of knowledge of students by the time of graduation, the system will generate conclusions about the quality of graduate training, the effectiveness of a separate faculty, university and the regional system of vocational education as a whole.

The expansion of the educational field in the modern world is available thanks to the popularization of self-education, so the educational landscape is replenished by various online learning services and platforms.

Based on the use of machine learning, the MOOC technology platform operates – massive open online courses¹. The personification of educational experience in this technology platform is achieved through elements of a unique ecosystem: data array analysis systems (Big data) generated by users; specialized social networks; “factories” for the production of educational content (For example, “Coursera”²). All this allows you to access online training organized by the best universities in the world, anytime and anywhere. Such intelligent learning systems, simulating the presence of a teacher, check the level of knowledge of students, using the analysis of their answers, make an individual training plan and give practical advice. This significantly reduces the level of workload for teachers, and forms a new trend in the field of vocational education. The teacher becomes a third-party consultant, one of the sources of knowledge translation, and not the leading subject of activity.

1 The technological platform “MOOC”. <https://mooc.asu.edu.ru/>

2 Educational platform “Coursera”. <https://www.coursera.org/>



Among the Russian IT companies, actively implementing machine learning in the educational sphere is “Yandex”. Of the projects implemented by the company, we note “Yandex.Practicum” and “Yandex.Tutor”.

“Yandex. Practicum” is an educational environment built on the learning process in real situations, therefore, as the course- developers note, “you learn programming and write code from the first lesson; in design classes you work with real layouts, and in English lessons you will immediately start talking”¹. The service is aimed at improving professional competencies and retraining specialists in the IT field.

Since 2018, the company has launched the educational service “Yandex. Tutor”². The interface of the service is represented by a set of interrelated elements: tasks are classified according to the level of complexity, thematic affiliation or integrated into variants of training control and measuring materials of the General State Exam / GSE and video tutorials on various subjects. In these projects, smart Service is not just a platform with video tutorials and online tests, it collects individual indicators of cognitive activity and practical skills of users. This allows you to apply the knowledge gained from machine data processing to make forecasts, identify patterns, build an individual growth trajectory, etc. (such data is reflected in the section “Smart recommendations based on your progress”).

Thus, by studying the indicators of an individual user, the services perform the function of programmed learning.

Intellectual services for the processing of bibliographic data are being popularized in the system of professional education and science. For example, “Bibloid” – is a subsidiary commercial project of the CyberLeninka electronic scientific library³. The functionality of which includes: processing the user's request, by keywords, generating a list of references, designed according to the requirements of GOST (All-Union State Standard). The machine learning-based service processes an array of information in a short period, providing a ready-made bibliography as a result. For modern researchers, this service allows you to save the most important resource – time. Therefore, its benefits are obvious. However, the array of open information may be insufficient, due to the variety of types of research sources and the specifics of a particular field of scientific knowledge.

Pedagogical practices related to machine learning involve the personalization of the learning process; automation of knowledge assessment; configuration and setting of educational materials; analysis and visualization of educational material. Next, let us consider the prospects of digital solutions as learning tools tested at the Faculty of History of Astrakhan State University.

The introduction of new tools into the learning process should always be justified by logical answers to the questions: “What educational task can be solved with their help?”, “How will this affect the quality of training of students?”

1 Yandex.Practicum is an online education service. <https://practicum.yandex.ru/>

2 Yandex.Tutor – video tutorials, search for materials and analysis. <https://yandex.ru/tutor/>

3 Bibloid is an intellectual assistant for the researcher. <https://bibloid.ru/>



Taking into account the peculiarities of the regional scale, it is possible to identify the main problems and tasks that must be solved by the educational system.

Thus, the rich historical and cultural space of the Astrakhan region forms the basis for “diversification of the existing tourist product and the formation of the region as a centre of cultural and educational, event, pilgrimage, ecological, sports and amateur fishing tourism” (On the Strategy of Socio-Economic Development of the Astrakhan Region..., 2020). This means that the region needs professional historians, guides and local historians who are able to popularize the Astrakhan region as a centre of cultural heritage of the Caspian region.

In addition to the economic goal, it is necessary to take into account that the digital transformation of education requires the “rejuvenation” of teaching staff. As for young professionals, innovations are a catalyst for everyday life and career growth. In turn, this requires the increase in number and improvement of the quality of the group of applicants entering historical specialties.

At the same time, according to the statistics of 2021, due to the results of the final certification (USE) of graduates of Russian schools in the academic subject “History”, the average score was 54.9. Over the past 5 years, there has been a negative trend in dynamics: a decrease in the number of graduates choosing history as an exam subject. Therefore, for example, compared to 2020, the number of people who took the Unified State Exam in history in 2021 decreased by 3 thousand people, the average score remains unchanged from 2019. The reasons for such indicators are the complication of the tasks of the control and measuring materials of the Unified State Exam in history (including working with sources, historical maps and writing a historical essay), as well as the expansion of the content by including a large volume of topics on the universal history.

Despite the general decline in the Unified State Exam in history, there is a consistently high competition among applicants at the ASU Faculty of History. Therefore, in 2021, the passing score in the direction of Pedagogical education profile “History and foreign language” was 209 points and the profile “History and social studies” – 201 points. The formed contingent of students of the Faculty of History provides a qualitative basis for building up the professional capital of historical personnel of the Astrakhan region. In turn, the historical and pedagogical staff of the faculty needs to introduce such digital tools that could solve the key and system-forming task of increasing the motivation of students to become professional historians.

In a representative respect, the following digital technologies introduced into the educational process of students of the Faculty of History as a means of teaching have shown their effectiveness at the testing stage. Let us characterize some of them.

1. Chatbots are programs developed by and for people, based on machine learning and neural networks. They are used to automate or personalize the educational process. Chatbots differ in their target orientation, they can be created



to remind or notify (about upcoming classes in a discipline; about the topics of an upcoming seminar; about the necessary materials for classes, etc.). Alternatively, to provide students with educational content. In terms of reducing classroom time, teachers narrow the scope of the content of the lecture material. It is convenient to broadcast this material via chatbots, which will not just deliver it to the addressee, but check whether he has read it, and how much successfully. In addition, with the help of chatbots, it is possible to broaden the horizons of students in the discipline by investing in the program articles on problematic issues of historical science, historical or documentary films, and digital copies from historical sources. The undoubted convenience of chatbots lies in the assessment of students' academic performance. In the chatbot functionality, tests, quizzes or simplified cases are easily configured to test students' knowledge. He is able to "train" students in historical terminology and dating, personally identifying the problematic areas of knowledge of the student. In addition, the chatbot is a convenient place to collect tasks of an increased level of complexity, for example, detailed answers in the essay format. In order to optimize the time, chatbots can be used as «responder» to students' questions. In the process of independent preparation for seminars, or, after lectures, students have a range of diverse questions, but as a rule typical for pedagogical practice. Chatbots respond to them independently, thereby saving time and labor costs of teachers. At the same time, this method is more effective from a psychological point of view, since it eliminates the possibility of discomfort during communication (Flach, 2015).

The Aimylogic software is used to construct chatbots¹ and is implemented within the framework of teaching the disciplines "Methods of teaching History" and "Methods of teaching Social Studies".

2. For modern visualization of the content of historical education, it is important to use services that "enliven" with the help of neural networks, artistic paintings of historical events, historical portraits and photographs. For example, this is the free service "Deep Nostalgia"². With the help of a neural network, the system independently analyzes the input data (a photograph, a digital copy of the picture), highlights and improves the parameters of the face, and animation becomes the output data. Animation creation takes a few seconds, the service itself is easy to use, which is an undoubted advantage, since it does not require specialized skills in working with digital technologies.

Such "live" visual learning tools significantly increase the cognitive interest of students; contribute to the development of visual memory. At the same time, the use of this tool in teaching poses an individual task for the teacher – the adaptation of traditional methods and techniques of using visualization tools or their complete methodological update.

1 Puzzle Bot Aimylogic. <https://aimylogic.com/ru>

2 The instrument Deep Nostalgia from Myheritage – a machine learning technology for animating faces. <https://www.myheritage.com/deep-nostalgia?lang=RU>



3. LMS platforms ((Learning Management System – learning management system). To date, the LMS Moodle system (Modular Object-Oriented Dynamic Learning Environment – modular object-Oriented Dynamic learning environment) has been integrated into the educational activities of many Russian universities, including ASU¹.

The architecture of the system consists of modules for courses – “workbook”, “lesson”, “test”, “glossary”, “questionnaire”, “wiki”, “seminar”, “resource”, “task”, “chat”, “survey”, “and forum” and others. The functionality of LMS Moodle determines the advantages of its use: it allows you to control the work of students in the system; provides the ability to store and systematize educational material that allows students to study theory and assess the degree of its assimilation.

The system is based on collaborative learning technologies (joint solution of educational tasks, exchange of knowledge and materials, building various models of communication of users “teacher-student”, “teacher-students”, “student-student”).

The enriched assessment system provides new opportunities for designing independent activities of students. LMS Moodle evaluates tests, analyzes students' academic performance and compiles statistics on the assimilation of the studied materia

In addition, the system optimizes the learning process based on time management. Moodle saves the teacher's time by automating the assessment and analysis of students' progress, as well as through the video content generated by the teacher. This allows you to reduce the level of labor costs of the teacher and increase the time for interaction with students. For students, Moodle effectively builds a learning trajectory based on the ordering of tasks, evaluating the duration of actions in the system, reserving time, helping to make decisions on priorities, accounting for completed learning tasks.

Among the advantages of using Moodle, identified on the basis of a survey of teachers of the Faculty of History of Astrakhan State University, we designate: a high level of visualization of educational content. The system allows not only to work in the “screen demonstration” mode or online lectures, but also to integrate other services, systems into the learning process, to include interactive learning tools in the process (excerpts from films, videos, and copies of sources, interactive maps and other visual material). Improving the level of academic performance among students who are absent during classes. This can be traced due to the openness and systematization of educational material to which every student has access, which significantly reduces the percentage of non-completion of tasks and improves the key characteristics of teaching (clarity and communication). Thus, differentiation and catching up of educational material is effectively carried out, the construction of individual student learning routes.

It is worth noting that at Astrakhan State University, the Moodle system, as a platform for distance learning, has been successfully integrated into the educa-

1 Moodle – digital learning. <https://moodle.asu.edu.ru/>



tional process. At the Faculty of History, this system is included in the mixed learning format. This is manifested in the proportional distribution of study time (lectures are held online, practical classes are held in person). During the period of restrictive measures introduced in the Astrakhan region, due to the spread of coronavirus infection, students of the second and third courses of the ASU Faculty of History were fully transferred to distance learning. Communication of students and teachers during the passage of industrial and pedagogical practices has been simplified. Questions of reporting, consulting and evaluation are held on the Moodle platform, which allows students not to interrupt the internship process for face-to-face meetings. The system is used as a platform for students' teamwork in creating projects, performing creative tasks or research activities. The distribution of responsibilities, ranking by roles in the team, quick exchange of materials and convenient communication are among the few advantages for students. For teachers, the main advantages are the ability to monitor the success of team activities at each stage of implementation, its correction and navigation of participants in the process of completing tasks.

Conclusions

The digital transformation of the education system in general, historical education in particular, is associated with the optimization of the process of training professional personnel, taking into account the needs of the region that is building its development strategy.

Astrakhan historically played an important role in the Caspian region, was a crossroads of cultures and civilizations. The status of a geostrategic region at the present stage strengthens the role of the Astrakhan Region in building an intercultural dialogue with its neighbors in the Greater Caspian. The preservation of historical and cultural heritage, acquaintance with it not only by Astrakhan residents, citizens of Russia, but also the broadcast of the best samples into the world space, becomes a factor of cultural security of our country, its openness and attractiveness. A lot of work needs to be done in this direction. In this regard, the task of training highly qualified professional personnel, including historians, with the help of digital educational tools capable of solving problems of regional development, seems relevant. This was the purpose of the authors' research, the results of which are presented in this article.

For the system of historical education, these processes are no less relevant. Digitalization of education is able to optimize the process of training personnel (analysts, experts, teachers) who will be in demand by the modern labor market. Software solutions based on machine learning not only improve students' academic performance, optimize the educational process, but also contribute to increasing motivation for learning activities, further professional development and growth.



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