Heliyon 8 (2022) e09965

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Research article

The effect of online learning in modern history education

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ARTICLE INFO

Keywords:
Digital technologies
Education system
History
Interactive learning environments
Online platforms

ABSTRACT

Interactive digital technologies have become relevant in modern education. The use of these technologies in the classroom contributes to the development of professional competencies and skills. The purpose of the study is to analyze the effectiveness of interactive learning environments and online platforms in learning history. The features of modern online learning platforms and the possibilities of their use in the study of history have been analyzed. The research was carried out at the Department of National History of Moscow City University (Moscow, the Russian Federation). The experiment involved 623 history students of different years of study of the following training profiles: "History" (124 students of 1–4 years of study) and "Pedagogical education" ("History and a foreign language", "History and social studies" – 399 students of 1–5 years of study). Also, the survey was addressed to 29 faculty members from the university under consideration. The results of the first survey show that the majority of students (62%) noted the use of traditional methods and 38% of respondents indicated the use of the modern ones. The majority of students (52%) also answered that digital tools are rarely used in the study of history while 71% of respondents reported that digital technology affects their motivation to learn. Therefore, the majority of students rated their level of motivation as average (43%) or low (47%). The most frequent professional competencies and skills are "technical competence (modern technologies)" (62%), "creativity" (65%), "critical thinking" (60%), "strategic thinking" (55%), and "practical skills" (78%). Based on the results obtained in the first survey, a program was developed to increase the motivation of students to study history and archeology, as well as to familiarize themselves with modern educational technologies that can be used in the learning process. The second survey showed an increase in the indicators of students' motivation to learn, which indicates the effectiveness of the developed program for the study of history. The majority of students (85%) answered that digital tools affect their motivation to learn. Thus, they rated it as medium (50%), high (20%) and low (30%). Accordingly, the indicators of professional competencies and skills increased by 10%: "technical competence (modern technologies)" (72%), "creativity" (75%), "critical thinking" (71%), "strategic thinking" (65%), and "practical skills" (88%). No less significant were the shifts in students' creative thinking development indicators – they changed from 18% (before the experiment) to 58% (after the experiment). The practical significance and prospects for further research are explained by the possibility of using the developed program for the study of history in other universities located in different countries. Also, the methodological basis of the proposed program can be used to study not only history but also other subjects as digital technologies are relevant in the modern education system.

1. Introduction

Modern education is shifting to the use of innovative technologies under the influence of the rapid development of science and technology. The pandemic has made significant adjustments to the educational process (Raju et al., 2021; Zhou et al., 2020). Distance learning requires educators to develop new methodological approaches, including interactive learning environments, online platforms, mobile apps, etc. (Cicha et al., 2021; Kamal et al., 2021).

In modern history education, digital tools are actively used to conduct a variety of studies (Edelstein et al., 2017). Digital technology provides historians with quick access to the sources they need as the archives are digitized and presented on the websites of libraries or online learning platforms (Chouchene, 2019). Based on digital information technologies,

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https://doi.org/10.1016/j.heliyon.2022.e09965
Received 16 December 2021; Received in revised form 18 February 2022; Accepted 12 July 2022

new methods are being developed for the analysis of historical data (digitization of materials, 3D visualization) and the study of history (Li and Jing, 2020). A similar study on the role of digital documents was carried out in Poland (Hiarnovich, 2020). At the same time, it should be noted that many historical works have not been digitized, which makes it difficult for historians to work in the context of the pandemic as there is no access to libraries. Thus, the problem of digital archives remains relevant.

Digital archives with photographs and documents make it possible to use them as visualizations in history classes thus attracting the attention of students and increasing their motivation to learn (Zaagsma and Wieneke, 2018). The impact of visualization and interactive technologies on the motivation of students to study history is analyzed while academic performance and perception of distance learning are also increased (Nam, 2017).

In the course of the pandemic, online learning was introduced through virtual classrooms, mobile applications, online learning platforms or special software. In the context of online learning, the possibility of using artificial intelligence and virtual classrooms is being considered; these can replace teachers and regular classrooms in higher education (Ikedinachi et al., 2019).

History teaching has been transformed by the digitalization and informatization of society (Crymble, 2021). The effectiveness of the study of any subject, in particular history, depends on the methods used by teachers. Accordingly, traditional methods that were used in teaching history before (reading paragraphs, taking notes, memorizing dates, using printed maps or atlases) have become obsolete and ineffective today. The use of old methodological approaches indicates that teachers are not ready to actively use modern interactive technologies (Pongsakdi et al., 2021). Due to the fact that one of the current methods is practice-based learning, it is effective to use modern interactive technologies to study history (Epstein and Salinas, 2018).

1.1. Literature review

Today teaching various subjects, in particular history, in the context of higher education is accompanied by the application of interactive digital tools in order to visualize theoretical material (Yildirim et al., 2018). For example, researchers from the Netherlands have proposed the use of a macroscopic scale to explore historical data with the help of digital tools (Hoekstra and Koolen, 2019). The feature of this tool is the ability to explore a large amount of historical information. A gyroscopic instrument based on a 3D digital model has been developed in Germany (Niklaus et al., 2019). Such models can be used in augmented and virtual reality. A similar study was carried out in Slovakia based on the research of historical mountain objects with the help of 3D visualization (Pavolová et al., 2019).

Interactive learning environments and online platforms are one of the most effective learning methods in the modern world (Borba et al., 2018; Ismailova and Ergashev, 2019). Modern online platforms make it possible to study any subject due to their rich functionality (Ijaz et al., 2017). All online learning platforms are characterized by different directions. However, most modern online educational platforms are universal, so they can be used to study the history of any period. For example, the online learning platform Coursera hosts various courses taught by the representatives of foreign universities (Korableva et al., 2019). At the same time, the advantage is that many courses are in English, which contributes to the development of linguistic and communicative competencies. This online educational platform can be used to study history, as it provides courses to study the history of different periods and countries, which teachers can use as supporting material for the study of history.

The online platform Udemy is aimed at the development of various courses, which make it possible to improve not only professional competencies but also increase general skills, which indicates the use of a student-centered teaching approach (Hooshyar et al., 2019). The advantage of this platform is its special features that allow history teachers to conduct online classes about different historical events, demonstrate audio and video recordings, as well as design tests and deliver them to students.

In the context of art, there is Skillshare platform that is primarily focused on the development of creativity and lateral thinking (Arya et al., 2021). The platform contains films, video tutorials, and animation that can be used in history lessons as an additional type of visualization of theoretical material. There is also a similar online platform – MasterClass – which offers courses for developing professional skills related to various art topics. The advantage of both platforms is a wide range of interactive materials that are focused on practice and contribute to the development of practical skills and competencies.

On the other hand, researchers from the UK and Columbia point to a new era of "digital" history, which can break the ground in science through the use of online tools for studying historical facts. For instance, they note that even in wealthy Western countries, social barriers and inflated expectations of history students may disappear due to the intensified use of computers and other digital tools by their educators. Scholars also indicate that digitalization provides every student with free access to information: one can virtually visit a history museum in another part of the world or read ancient manuscripts that are available online (Crymble and Afanador-Llach, 2021).

A study conducted in the United States showed the effectiveness of the educational platform "EdX", which contains a lot of courses in the humanities, language studies, and the arts (Shih et al., 2015). The advantage is the use of the STEM approach, which promotes the development of interdisciplinary areas and thus contributes to the development of professional competencies in several areas of knowledge at the same time.

The online platform "Khan Academy" is focused on the practical application of the theoretical knowledge gained as it contains exercises and videos demonstrating theory (Rueda and Rey, 2018). The advantage is the ability to practice and visualize theoretical material about history. The disadvantage is the impossibility of conducting online classes on the platform as users can only download and use ready-made materials.

The TED platform contains many video lectures on various topics, which can be used not only in teaching, but also for general development (Özmen and Yucel, 2019). This allows students to develop not only professional competencies but also personal skills. In addition, the online platform is in English, which contributes to the study of subjects in English and the development of communicative competence. Mit Open CourseWare is another platform that provides video content to be used in the educational process as additional tools for the theoretical material visualization about history.

Google Classroom is an interactive learning environment that allows users to create a virtual classroom that can be accessed by the teacher and students studying a specific subject (Fitriningtiyas et al., 2019). On the platform, the teacher can share lectures about history, video or audio recordings about different historical events, as well as develop tests or other assessment assignments. In line with this, students get an e-mail notification about the task and the deadline for its completion; they upload their assignments and can see the assessments received. The disadvantage is the impossibility of conducting online classes.

"WizIQ" is a virtual classroom, which enables educators to design their online courses in a specific subject (Ahmed and Osman, 2020). The advantage is the interactive platform format, which facilitates the visualization of theory about history in the form of courses created by the teacher, which allows students to watch video lectures several times at any time.

The Interactive Learning Environments group, represented by Zoom, Skype, Google Meet, etc., makes it possible to implement distance learning (Demir et al., 2020). The advantage of these programs is online lessons can be delivered on the platforms. In addition, screen sharing

functionality allows teachers and students to show presentations, video or audio recordings, which contributes to the visualization of theoretical material.

The study of the digitalization of education in Russia is quite relevant in terms of analyzing the primary students' interaction with digital content. Research (Gairbekova, 2021) shows that the basic opportunities for Russian students to access online learning are rather poor. For example, the Russian population is not adequately provided with the Internet, and no significant positive shifts in this respect were noted during the period under consideration. On the other hand, such a situation makes the community view the need for an effective education transformation from a new angle. According to educators, the distance education process often implies low academic performance (as handout materials are more perception-friendly), loss of students' ability to create and show initiative, fear of public speaking, formal attitude to the tasks performed, harmful effect of computer on mental and physical health, sense of false competence (when information access is equated to competence mastery), and weak socialization (Orishev et al., 2020). Therefore, the study of history should be detailed and take into account the characteristic aspects of Russian higher education system.

The purpose of this study is to investigate the effectiveness of interactive learning environments and online platforms in learning history. The objectives of the research are as follows: on the basis of a survey, to reveal the level of university involvement in digital technologies and the level of students' motivation to study history; to develop a program with the use of digital technologies; on the basis of a repeated survey, to reveal the effectiveness of the developed program and its effect on the indicators of students' motivation to study history.

2. Methods and materials

2.1. Research design

The study relied on the experimental method in order to conduct two surveys before and after studying the developed program to indicate the level of university involvement and the level of students' motivation to study history. In addition, a modeling method was used when developing a program to increase the level of students' motivation to learn through the use of modern digital technologies.

2.2. Sample

The research was carried out at the Department of National History of Moscow City University (Moscow, the Russian Federation). A total of 623 students took part in the experiment: 124 students of 1–4 years of study of the "History" profile and 499 students of 1–5 years of study of the "Pedagogical education" profile. The main criteria for the selection of students were to indicate the year of study and specialty (Table 1). Concurrently, age and gender characteristics were not taken into account. Students of other training profiles did not participate in the experiment. Along with the student respondents, the survey process also involved faculty of the same department. Their initial sample encompassed 29 people.

Table 1. Student sample characteristics.

Indicators	Department of National History, Moscow City University (Moscow, the Russian Federation)	
Number	623	100%
Year of study	1	25%
	2	20%
	3	20%
	4	20%
	5	15%
Training profile	History	20%
	Pedagogical Education	80%

2.3. Survey

There were 5 research stages. During the first stage, a survey was conducted. All students were sent a Google form with the following questions: “Which methods of studying history are used in your educational institution: traditional or modern ones?”, “Are digital tools used in the classroom to study history?”, “Does the use of digital tools affect your motivation to study history?”, “Assess your level of motivation to learn: high, average, low”, “What professional competencies and skills develop when using digital tools?”, “Is it necessary to introduce modern digital technologies into the educational process?”. There were no time limits to answer the questions (Figure 1).

The training program consisted of a thematic module "Digital technologies in the study of history" divided into classes aimed at the acquaintance with digital technologies, increasing motivation to learn and improving the level of knowledge of history (Table 2). To study the developed program, the students needed a computer and headphones to view the educational materials and videos or access the educational platforms. The implemented digital program allowed students to view images (videos) and was part of the tasks given. For example, after reading the relevant materials, students had to find common and distinctive features of two historical processes within the study of a topic. The human resources involved in the learning process are the students who participated in the experiment and the teachers of the university where the experiment was conducted. All classes took place in special university classrooms; for the sake of convenience, the students were divided into several groups of 15–20 people. The training course duration was 1 month. The materials to familiarize students with digital technologies and the peculiarities of their application in the study of history were selected for the course. The modern historical period of world history development was chosen to study history, so the topics of the program were devoted to the study of various aspects of the history of different countries, with an emphasis on Russian history. The program focused on the global (recent) history section of the international relations of the Russian Federation and covered the following topics: “The Modern Stage of International Relations,” “The Collapse of the Bipolar System of International Relations,” “The Collapse of the USSR and the Changes in the Global Balance of Power,” “Changes in Foreign Policy of the US, China, Europe, and Arab countries,” “Regional and Global Politics in the 1990s,” “International Terrorism,” “International Relations in the 21st Century and Global Politics,” “Global Problems of Humankind,” and “Russian Foreign Policy and its Place in International Relations.” History books (“Mastering Modern World History” (Lowe, 2013); “Princeton Review AP World History: Modern Premium Prep” (Princeton Review, 2020), and “History of International Relations: A Non-European Persp ective” (Ringmar, 2019)) were also selected as the course focused on the study of history and the use of digital technologies in the study of history. The program provides a high level of visualization of the material for students – in addition to the text, respondents have the opportunity to perceive the accompanying audio, media, and graphic materials on the topic.

The third stage involved teaching students of the Department of National History (Moscow City University, the Russian Federation) in accordance with the developed program. The developed training program was uploaded on the Moodle platform. The teachers and all students received access to the course. To get acquainted with the training program and view all its components, it was necessary to sign in with a Google account; everyone was sent an invitation to join the course and an access code by e-mail. To enter the system, each teacher or student had to enter their e-mail address and the access code. The platform page contained the program, the materials and links to all websites for the acquaintance with digital technologies or downloading the applications needed for training.

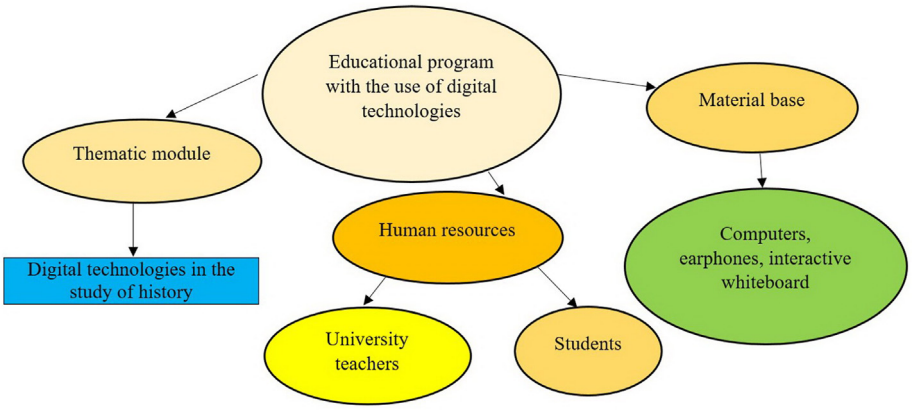

Figure 1. The structure of the training program with the use of digital technologies.

During the fourth stage, a repeated survey was conducted in order to identify the effectiveness of training in accordance with the developed program. The procedure was the same as for the first survey. However, the questions related to the motivation of students to learn were selected for the experiment: "Does the use of digital tools affect the level of your motivation to study history?", "Assess your level of motivation to learn: high, average, low," "What professional competencies and skills develop when using digital tools?".

Students' creative thinking was checked both before and after the implementation of the program. For this purpose, Williams' "cube" model for students' creative thinking testing was used (Williams, 1979).

The survey of the course teachers as equal subjects using digital educational tools was carried out in the form of in-depth interviews. As the number of teachers was optimal for processing their results individually, about 10–15 min were allocated for the conversation with each of them. The questions posed were standard and structured, e.g., "Would the system of teaching historical subjects improve with the help of online platforms?", "Were you comfortable working with students with the help of online platforms?", "Would the digitalization of teaching students affect their creative thinking levels?"

The next step was to test the impact of the program used on students' academic performance. Specifically, weighted student module control results were compared before and after digital tools' implementation. While the first module test included topics studied before the implementation of the program, the second one incorporated the set of topics covered online directly via the platform.

2.4. Statistical processing

The respondents' responses were processed in Statistica and Microsoft Excel and separate diagrams reflecting each question indicators were created.

2.5. Research limitations

The limitations of the study are associated with a small sample as the experiment involved only one university (the Department of National History, Moscow City University, Moscow, the Russian Federation); other universities in different countries were not studied.

2.6. Ethical issues

The authors declare that the work is written with due consideration of ethical standards. The study was conducted in accordance with the ethical principles approved by the Ethics Committee of Moscow City University (Protocol № 9 of 15.09.2020). The experiment was carried out in compliance with all ethical standards and anonymity; there were no requirements to provide confidential information (name, surname or place of residence, etc.). The respondents gave their written consent for the conduct of the research and data processing. One of the requirements was to indicate the year of study at the time of the experiment.

3. Results

Figure 2 shows the respondents' answers to the question "What methods of studying history are used in your educational institution?" The majority of students (62%) noted the use of traditional methods and 38% of respondents indicated the use of the modern ones. Simultaneously, it should be noted that traditional training supporters were overwhelmingly women – 69%; most males preferred digital applications in education. These indicators demonstrate the poor level of development of technical competence and digital skills, which need to be introduced into the educational process. Factors that have influenced such figures may be teachers' use of traditional teaching methods based on paragraph reading, memorization and mechanical reproduction of

Table 2. The structure of the training program with the use of digital technologies.

Thematic module	Thematic module components	Tasks	The resources used
"Digital technologies in the study of history"	Digital technologies: - interactive whiteboard; - desktop computers and laptops; - projectors; - 3D printing; - artificial intelligence; - virtual reality.	– Formation of digital competence in the learning process; – Increasing motivation to study history; - improving the level of knowledge of history	– Computer with Internet access; headphones; interactive whiteboard; – Textbook "New Digital Technology in Education" (Ng, 2015); – Course "Internet History, Technology and Security" (Coursera, 2021b); – Book "Mastering Modern World History" (Lowe, 2013); - Book "Princeton Review AP World History: Modern Premium Prep" (Princeton Review, 2020); - Book "History education, identity formation, and international relations" (Klerides, 2017); – Textbook "Technology in Education: The History" (Harkness, 2019) – Course "Artificial Intelligence for all" (Coursera, 2021a); – Course "Virtual Reality" (Coursera, 2021c).

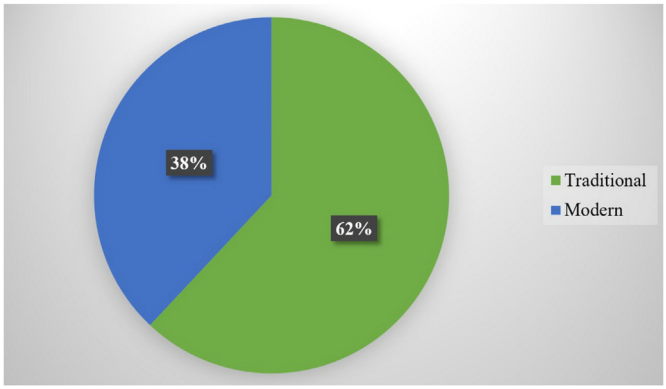

Figure 2. The respondents' answers to the question "What methods of studying history are used in your educational institution?"

teaching material, as well as low level of technical competence of teachers, unwillingness to use modern digital technologies in teaching and learning, to involve students in modern teaching methods and teaching approaches.

The majority of students (52%) noted that digital tools for the study of history are rarely used in the classroom. At the same time, 30% said that digital tools are not used in history learning and only 18% reported their use in the classroom, which indicates a poor level of knowledge about modern digital technologies and the peculiarities of their application in the classroom to study history. Since the vast majority of students reported a low level of history education digitalization, this field has considerable room for further improvement. On the other hand, students noted that the prevailing part of digital material deals with key historical facts (e.g., World War II), whereas less significant dates are omitted in these terms. The reason for this is primarily the poor availability of the literature dedicated to less popular topics in the foothold of Russian studies.

Also, 71% of respondents noted that the use of digital tools affects their motivation to study history, 19% of students found it difficult to answer the question and 10% said that digital technology use does not affect their motivation for learning history. As the share of those who did not catch a motivational impulse from using digital learning tools (10%) is too small compared to individuals recognizing the benefit (71%), a suggestion can be made on the possible fruitfulness of creating a digitalized mechanism encouraging humanities study. At the same time, such results might be influenced by globalization, IT spread in education, the global coronavirus pandemic, and the overall effect of the digital society.

The students assessed their motivation to study history as average (43%), low (47%), and high (10%). Such indicators indicate the average level of motivation of students to study history. Factors that have influenced such numerical indicators may be students' lack of interest in teaching in general, teachers' use of outdated teaching methods and uninteresting presentation of educational material to students, limited use of modern teaching methods and digital technologies.

An interesting gradation of the motivational aspect was found in terms of age (respondents' academic year). First of all, it was unveiled that junior students were more motivated to study history using apps (true for almost 90%). Secondly, the overall level of motivation was noted to decrease significantly with the university year – from 78% in the 1st to 43% in the 5th year of study. These two outcomes can be caused by many factors: professional reorientation of seniors, digitalization of the youth, or more active use of digital apps in recent times.

It is worth noting that before the program was implemented, about 47% of history students were characterized by an average level of creative thinking development, while a high level of divergent thinking was inherent to less than one-fifth of them. This fact signifies an excellent potential for creative thinking as one of the key competencies in the considered field of study to be developed via education digitalization.

Figure 3 shows the respondents' answers to the question "What professional competencies and skills develop when using digital tools?" before and after the training course. Before the training course, the most frequent answers were “technical competence (modern technologies)” (62%), “creativity” (65%), “critical thinking” (60%), “strategic thinking” (55%), and “practical skills" (78%). After the course completion, the indicators of professional competencies and skills were as follows: “technical competence (modern technologies)” (72%), “creativity” (75%), “critical thinking” (71%), “strategic thinking” (65%), and “practical skills” (88%). At the same time, in comparison with the first survey, the indicators increased by 10%. Such results indicate the need to extend the implemented course in order to obtain larger-scale shifts in the competencies mentioned. Quite interesting here is that “technical competence (modern technologies)” and “creativity,” the elements with the most advanced indicators, are closely interconnected within the analyzed historical course and were the subject of improvement among the students.

With that being said, almost all students (95%) agitated for the introduction of digital technologies in their educational process, considering it an integral part of the evolution of Russian higher education. Only 5% of the surveyed learners did not feel a particular need for it, which, however, is quite a small share. Among these 5%, almost all (88%) were unanimous supporters of traditional history teaching through textbooks (believing that the vastness of the Internet can distort the essence of the material).

Satisfactory in relation to the implementation of digital educational tools were also the faculty survey outcomes. The sample of educators as the future moderators of digital programs for Russian universities overwhelmingly agreed with the expediency of reforming the education system. Hence, almost 85% of them (Figure 4) were of the view that the system of teaching history will gain from the implementation of digital tools, while 65% were convinced that the digitalization of history education would positively impact student creativity.

At the end of the training course, there was another survey which demonstrated an increase in all indicators. Therefore, after training, the majority of students (85%) noted that the use of digital technologies affects their motivation to study history while 10% found it difficult to answer this question and 5% noted no effect of digital tools on their motivation level.

Compared to the results obtained in the first survey, the students assessed their motivation to study history as high (20%), average (50%), and low (30%).

Alongside this, the results of the improvement in students’ academic performance were quite noticeable when comparing the results of respondents' module (interim) control carried out before and after the implementation of the digital program (Table 3).

From the standard deviation data, we see that the average score for Module 1 was $\sigma 1 = 78.7$, while for Module 2, it equaled $\sigma 2 = 81.54$. This indicates a significant improvement in students' academic performance against the background of the digital application implementation. Based on the comparison of the results obtained in the two surveys, it can be concluded that the developed program is effective for the study of history. All indicators, in particular those related to the level of motivation, have increased, which indicates the possibility of introducing digital technologies into the educational process.

Faculty interviewing outcomes, on the contrary, testify to the availability of risks associated with the sudden shift to digital education. Overwhelmingly (85%), educators point to insufficient technical support to universities, which prevents high-quality digital learning provision. Other risks also include poor digital knowledge among teachers, low level of optimality of the Internet base, and its insufficient transparency in Russia.

Historical materials are digitized with the help of digital technologies to be uploaded in open online archives. For example, the Russian Historical Society has posted digitized archives that contain historical data of Russia on its website (Figure 5). The archive simplifies the search for

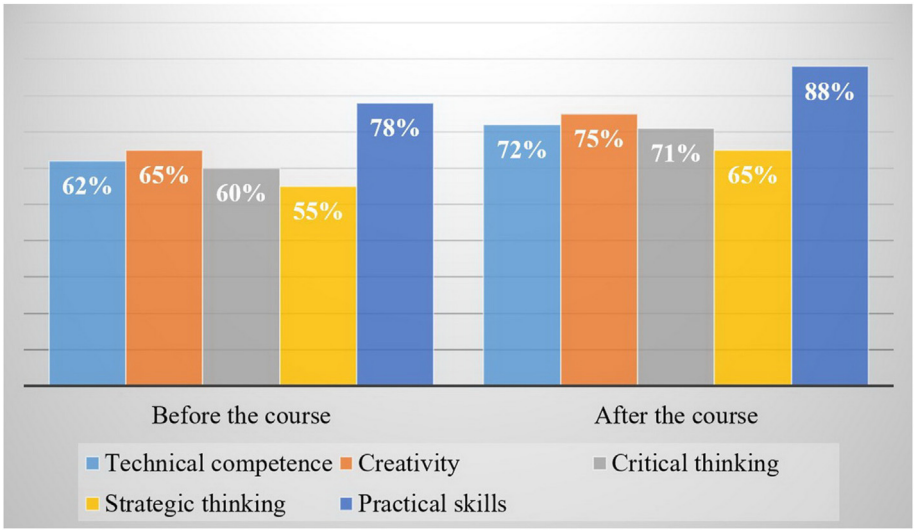

Figure 3. The respondents' answers to the question "What professional competencies and skills develop when using digital tools?" before and after the training course.

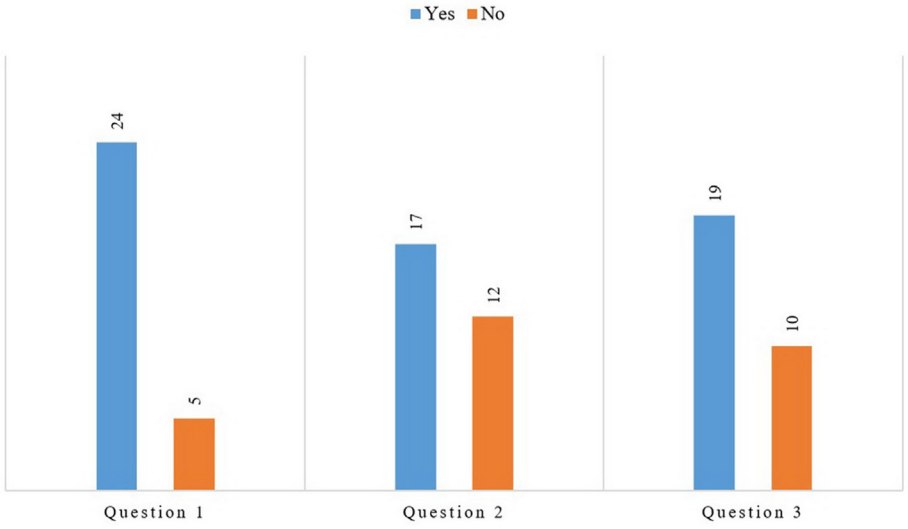

Figure 4. Faculty survey results ($n = 29$).

Table 3. Respondents' academic performance before and after digital program's implementation.

Student	∑ (Module 1)	∑ (Module 2)
X1	95.7%	99.56%
X2	95.6%	96.8%
X3	94.8%	95.23%
X4	92.44%	94.77%
X5	92.15%	94.333%
X6	91.95%	93.98%
X7	91.1%	93.33%
…	…	…
X205	81.3%	82.76%
X206	81.23%	82%
	…	
X622	9%	12%
X623	10%	9.76%

information about the history of Russia as it makes it possible to get acquainted with the archives online. Moreover, the online archive also contains archival information on other countries that took part in World War II, which is an advantage as historians can use such archives to study the history of not only Russia but also other countries (Figure 6).

Figure 7 shows the online archive "Arolsen archives", which makes it possible to find digitized historical documents related to the victims of Nazi persecution. Also, the website provides information in 6 languages, which is another advantage. However, the disadvantage is that the online archive gives access to only one historical period and students can use it to study the history of that period.

It is worth noting that online archives can also be featured on virtual library sites. For example, the Library of Congress website hosts electronic collections of historical documents (Figure 8). The advantage is the user-friendly interface divided into thematic groups. Thus, history students have an opportunity to quickly find the information they need to prepare for history classes.

During the pandemic, online libraries became more popular and they can replace archives. An example of such a library is the World Digital

Оцифрована кинохроника выступлений советских обвинителей на Нюрнбергском процессе

Кинохронику выступлений советских обвинителей на заседаниях Нюрнбергского процесса оцифровали Федеральное архивное агентство и Российский государственный архив кинофотодокументов (РГАКФД).

Проект «Шаги к Победе» (хроника последних дней войны). Документы из фондов РГАСПИ

В рамках проекта фонда «История Отечества» «Шаги к Победе» Российский государственный архив социально-политической истории передал для публикации ряд документов о Берлинской наступательной операции.

Документы ЦА МО РФ по освобождению концлагерей Заксенхаузен, Равенсбрюк

Публикуем перечень архивных несекретных документов по теме: «Освобождение Красной Армией лагерей смерти Заксенхаузен и

Документы из архива СВР России по истории советского атомного проекта

Сегодня, 17 сентября 2019 года, в Доме учёных им. А.П. Александрова НИЦ «Курчатовский институт» в рамках выставки «Физика и разведка в силовом поле атомного проекта»

Figure 5. Open archive of the Russian Historical Society.

Документы Центрального архива Министерства обороны Российской Федерации по теме «Освобождение Европы от фашистских захватчиков 1944-1945 гг.»:

Российское историческое общество публикует материалы, которые содержат информацию об освобождении частями Красной Армии оккупированной фашистами территории Европы, многочисленных потерях личного состава войск и взаимодействии советских военнослужащих с местным населением.

- Документы об освобождении территории Австрии
- Документы об освобождении территории Болгарии
- Документы об освобождении территории Белоруссии
- Документы об освобождении территории Венгрии
- Документы об освобождении территории Германии
- Документы об освобождении территории Латвии
- Документы об освобождении территории Литвы
- Документы об освобождении территории Молдавии
- Документы об освобождении территории Норвегии
- Документы об освобождении территории Польши
- Документы об освобождении территории Румынии
- Документы об освобождении территории Украины
- Документы об освобождении территории Чехословакии
- Документы об освобождении территории Эстонии
- Документы об освобождении территории Югославии

Figure 6. Open archive of the Russian Historical Society.

Figure 7. Online archive "Arolsen archives".

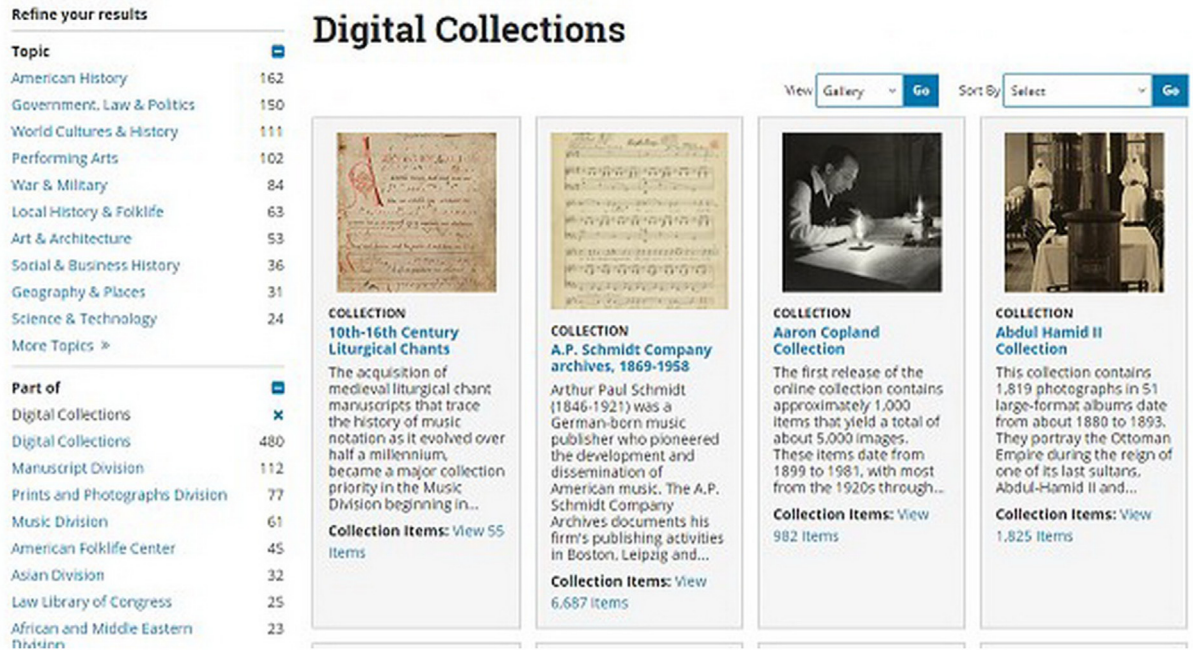

Figure 8. Library of congress.

Library supported by UNESCO and the US Library of Congress (Figure 9). The website contains materials related to world history, the history of the United States, European manuscripts, etc. The advantage of the library is that each topic is accompanied by visualization (pictures, photographs, interactive maps) while the material is structured by timelines. Such characteristics make it easier to find information and contribute to increased motivation and interest in the study of history.

Figure 10 shows the online archive "National archives" that combines national archives of the history of different countries, which is its advantage. Students can use this archive to search for world history e-books that are featured on the website. In addition, students can view posters and pictures that visualize historical events and facilitate the perception of information.

Thus, online archives and virtual libraries allow students to get acquainted with archival documents online while digital technologies, in particular visualization tools, make the process of studying history easier and more interesting, which increases student motivation to learn.

The results of creative thinking testing according to Williams' methodology demonstrate that, while only 18% of students had a high level of divergent thinking before the implementation of the digital program, their percentage advanced to 58% after the experiment ended. This testifies to the beneficial effect of digital means on the creative thinking of history students. That is, one of the supportive arguments in favor of history instruction digitalization is an increase in divergent thinking of higher education students. Creative thinking analysis conducted against the gender backdrop unveiled a significant improvement of this skill in females – from 37% (before the program) to 69% (after the program), whereas for males, this difference was not as striking – 29% and 43%, respectively.

4. Discussion

The results of the two surveys indicate the relevance of the problem of using digital information technologies in the educational process not only in Russia but also in other countries. For example, researchers in

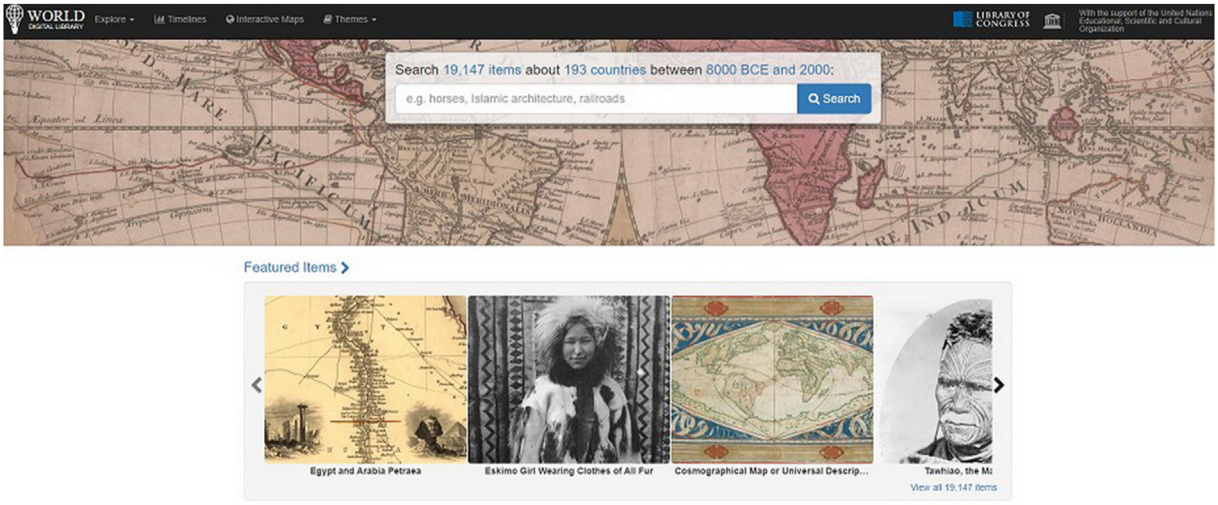

Figure 9. Virtual library "World Digital Library".

Figure 10. Online archive "National archives".

Australia and England have proposed 4D Printing Classroom as a virtual classroom. The mechanism feature is its interactive 4D format. As a result of the use, it was concluded that digital technology is effective in learning (Zolfagharian et al., 2021).

The possibility of using digital games in the study of history is also being analyzed (Shih et al., 2015). The developed game is based on real historical events. As a result, on the basis of the experiment, it was found that the cognitive skills of players increased under the influence of the game, which is a practical element of learning. A similar study was conducted in Portugal (Cruz et al., 2017). The mobile game was developed for the study of the history of Portugal and its user-friendly interface allows it to be used not only by students but also by schoolchildren. In addition, on its basis, new games to study the history of other countries can be developed. The JEGER app was developed to study the history of Indonesia, and its innovative character was proven by the student survey. Thus, 94% of respondents noted that the application can be used in the study of history and 89% appreciated its user-friendly interface (Sulistyo et al., 2020).

Researchers from Finland considered the effectiveness of 3D Immersive Learning Environments, online archives and online libraries in learning history and their impact on students' motivation to read (Mystakidis and Berki, 2018). As a result, it was concluded that the motivational characteristics of students were increased with the help of the interactive learning environment, online archives and online libraries. Similar results were obtained in the present study as after the completion of the developed program with the use of digital technologies, online archives and online libraries the level of student motivation increased and the indicators of professional skills and competencies also improved by 10%.

Researchers from the United States analyzed the use of online archives and libraries in the process of studying history and concluded that the level of motivation of students to learn under the influence of modern

digital technologies (Carbajal and Caswell, 2021). The advantages of using online libraries and online archives, as in our study, identified ease of use, visualization of historical events and historical figures, digitized documents of different historical periods and maps, movies and videos on historical events and others.

In Taiwan, spherical video-based virtual reality (SVVR) was developed to be used in art history studies (Wu et al., 2021). Based on the experiment, it was concluded that this digital technology is effective in improving students' self-efficacy and academic performance indicators. At the same time, it is emphasized that learning based on virtual reality has not affected the cognitive skills of students.

Turkish researchers examined the effectiveness of the online education platform WiziQ in learning (Ahmed and Osman, 2020). As a result, it was concluded that it affects motivation, academic performance and relations between students, which was evidenced by the results of the group that studied on the online platform. In the present study that relied on the Moodle platform, similar results were obtained. American researchers also emphasize the effectiveness of online educational platforms noting the importance of feedback that online platforms provide (Goldin et al., 2017). On the other hand, Malaysian scholars point out that introducing HOTS into history education will attract students to historical disciplines and improve their academic achievements. In addition to this, the introduction of HOTS is believed to facilitate creating a quality educational system in Malaysia capable of competing in the global market. Researchers claim the direct effect of the digitalization of history education on the level of students' creativity. Therefore, the results of the present paper have many in common with the inferences from related publications of world scholars (Parimaladevi and Ahmad, 2019).

5. Conclusions

The results of the first survey show that the majority of students (62%) noted the use of traditional methods and 38% of respondents indicated the use of the modern ones. The majority of students (52%) also answered that digital tools are rarely used in the study of history while 71% of respondents reported that digital technology affects their motivation to learn. Therefore, the majority of students rated their level of motivation as average (43%) or low (47%). The most frequent professional competencies and skills are "technical competence (modern technologies)" (62%), "creativity" (65%), "critical thinking" (60%), "strategic thinking" (55%), and "practical skills" (78%). Based on the results obtained in the first survey, a program was developed to increase the motivation of students to study history and archeology, as well as to familiarize themselves with modern educational technologies that can be used in the learning process. The second survey showed an increase in the indicators of students' motivation to learn, which indicates the effectiveness of the developed program for the study of history. The majority of students (85%) answered that digital tools affect their motivation to learn. Thus, they rated it as medium (50%), high (20%) and low (30%). Accordingly, the indicators of professional competencies and skills increased by 10%: "technical competency (modern technologies)" (72%), "creativity" (75%), "critical thinking" (71%), "strategic thinking" (65%), and "practical skills" (88%). The novelty of this study resides in the justification of a significant reform in higher history education through the introduction of digital means in teaching. Furthermore, the collected findings confirm the positive impact of education digitalization on students' creative thinking (from 18% to 58%). The practical significance and prospects for further research are explained by the possibility of using the developed program for the study of history in other universities located in different countries. Also, the methodological basis of the proposed program can be used to study not only history but also other subjects as digital technologies are relevant in the modern education system.

Declarations

Author contribution statement

Olga Malysheva: Performed the experiments; Contributed reagents, materials, analysis tools or data, Wrote the paper.

Elena Tokareva: Conceived and designed the experiments; Performed the experiments; Wrote the paper.

Larisa Orchakova: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Yulia Smirnova: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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