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VIRTUALIZATION OF MUSEUMS AS AN ELEMENT OF THE MODERN EDUCATION OF YOUNG TOURIST SPECIALISTS

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Wirtualizacja muzeów jako element kształcenia nowych kadr turystycznych

Streszczenie

Artykuł uzasadnia celowość szkolenia specjalistów w dziedzinie turystyki za pomocą wirtualizacji muzeów. Podkreślono, że rozwój nowoczesnych technologii informacyjnych kształtuje teorię i praktykę edukacji elektronicznej. Zaprezentowano częściowo różne definicje terminu „muzeum wirtualne", typy wirtualnych muzeów, kryteria ich klasyfikacji, przyczyny popularności oraz historię ich rozwoju. Podkreśla się, że wirtualne muzea charakteryzują się różnorodnością strukturalną i funkcjonalną oraz mają ogromne znaczenie dla rozwoju turystyki kulturowej. Przedstawiono wyniki ankiety studenckiej, które potwierdziły zasadność wykorzystania wirtualnych wycieczek w procesie edukacyjnym: jest to interesujące dla uczniów, podnosi poziom opanowania wiedzy i umiejętności zorientowanych zawodowo, sprzyja rozwojowi trwałego pogłębionego zainteresowania komunikacją z obiektami muzealnymi, rozwija zdolności twórcze, kształtuje kompetencje medialne. Wykazano, że muzea wirtualne dają możliwość wypełnienia procesu uczenia się nowymi, ciekawymi treściami poprzez wykorzystanie nowoczesnych technologii internetowych.

Słowa kluczowe: turystyka kulturowa, wirtualne muzeum, wirtualna podróż, edukacja, szkolenie specjalistów ds. turystyki.

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Abstract

The article justifies the expediency of training specialists in the field of tourism by means of museum virtualization. It is emphasized that the development of modern information technologies shapes the theory and practice of electronic education. Various definitions of the term 'virtual museum', types of virtual museums, criteria for their classification, reasons for popularity, and the history of their development are partly presented. It is emphasized that virtual museums are characterized by structural and functional diversity and are of great importance for the development of cultural tourism. The results of a student survey are presented, confirming the feasibility of using virtual tours in the educational process: it is interesting for students, increases the level of mastery of professionally-oriented knowledge and skills, promotes the development of a sustained in-depth interest in communication with museum objects, the development of creative abilities, the formation of media competences. It is shown that virtual museums provide an opportunity to fill the learning process with new interesting content through the use of modern Internet technologies.

Keywords: cultural tourism, virtual museum, virtual tour, education, training of tourism specialists.

Introduction

Nowadays, with the widespread Internet and the latest technologies usage, visiting museums, exhibitions and galleries is not popular among young people. After all, there is a lot of necessary information on the Internet, access to which can be obtained in a matter of minutes, which significantly saves time. The Covid-19 effect is that online museums have become very popular. There one can visit all the exhibitions and see all the same things as in real life but without leaving your home.

In the modern world, the problem of preserving cultural heritage is acute as the perspective of the country, families, and the younger generation largely depends on it. And the creation of virtual museums is an ideal solution to this problem. Since not everyone is interested in learning about the past, especially teenagers and students, with the help of the latest technologies, 3D models and interactivity, the interest in knowing more about the past may increase.

In the era of media, educational institutions and museums increasingly use modern technologies and tools for educational activities, cultural and educational work. They mark the origin of a new form of cooperation between museums and educational institutions, multiplying the teacher's pedagogical experience and opening up new opportunities for students to learn cultural tourism. Due to new information technologies, virtual museums and pages in social networks allow to multiply the target audience many times and make museums more accessible and open. Despite numerous virtual museum attractions, they cannot completely replace real museum institutions as their work must be complementary in its character.

Materials and methods

In the process of organizing and conducting the research on virtual museums as a constituent of informative-educational environment of tourism disciplines, its theoretical part used analysis, synthesis, systematization and generalization of the Ukrainian and foreign scientists' works. As for its empirical part, the research used a questionnaire whose respondents were students that study tourism disciplines.

The latest educational technologies turned out to be extremely relevant first in the situation of the pandemic and war, when Ukrainian universities were forced to conduct and complete the educational process in a distance mode, and now in a mixed format. This is a special challenge for the tourism industry because it can have quite negative consequences: the tourism business has suffered a disaster, which will affect not only this industry in the sphere of economy, but also the development of tourism in the field of education. Under such conditions, efforts to convince students and applicants of the prospects of the specialisation and the profitability of the future profession, the need to preserve, support and deepen the students' interest in the chosen profession will require considerable pedagogical skills from teachers. First of all, it concerns the discipline of the professional and practical preparation cycle that first and foremost consist in forming skills used in one's professional life. Virtual teaching with an emphasis on virtual presence of virtual objects in case of the profession that in principle envisages active physical movement in the real space is an original supertask for teachers and students of tourism specialisation.

Today, information and communication educational systems occupy a prominent place, having a powerful potential and far-reaching prospects for development and implementation in the educational process. It is well known that information presented visually is better assimilated and remembered, in connection with which the expediency and increasing popularity of its visualization in the educational process is substantiated. In modern conditions, the task of visual presentation of information in the educational process of tourism students acquires special importance, it is a kind of test of the level of professionally oriented knowledge, professional skills, general and special competences, creativity, etc. In our opinion, the reception of visualization is especially expedient and effective in case of tourism students when it is most related to excursion activity aimed at getting familiar with various tourist objects, in particular, in museums. Virtual museums and excursions are technologies that offer dynamic forms of studies and assist with updating methodology of studies. On the whole, the virtualization of educational space of Ukraine will allow to provide continuity of monitoring, controlled from distance and mixed forms of studies (Meier, Saorín, Bonnet de León&Guerrero Cobos2020).

In order to identify the implementation effectiveness of virtual museums and excursions in the learning process, we conducted observation and testing of students of the Lutsk National Technical University at the Faculty of Customs, Materials and Technologies majoring in "Tourism". Students of the 1st and 2nd course of study were involved in the experiment as according to the educational program, the professional training disciplines such as "Business Excursions", "International Tourism", "Tourist Resources of Ukraine and the World", "Tourism organization" are studied at these courses. The experiment was conducted for two years. The selection of museums was carried out according to the themes of the initial components of the educational program "Tourism". For the experimental work, two groups of students were formed: a control group (n = 22 people) with the participants studying according to the traditional scheme of the educational process, and an experimental group (n = 20 people) of participants studying tourism disciplines with the use of virtual museums and excursions tools (Table 1). Testing included 30 test tasks and 30 visual recognition test questions. The students had to solve the test tasks, identifying the correct answer (A, B, C), for which they received 1 point. The total number of points determined the participants' level of acquisition of professionally oriented knowledge: a low level was determined by the presence of 1–10 points, an average level – 11–20 points, a high level – 21–30 points. The research conducted by the method of mathematical statistics made it possible to find out that at the beginning of the pedagogical experiment, there were no significant differences between the mastery of professionally oriented knowledge among the students of the control and experimental groups, which indicates their homogeneity.

Note: Upon the completion of the pedagogical experiment, the following changes were observed regarding the results of the test questions: the number of students with a low level of mastery of professionally-oriented knowledge in the control group decreased by 13.59%, in the experimental group by 25%; the number of students with an average level increased – in the control group by 9.08%, in the experimental group by 15%; the number of students with a high level increased – in the control group by 4.51%, in the experimental group – by 10%. At the end of the pedagogical experiment regarding visual recognition tests, the following dynamics of mastering levels of professionally oriented knowledge were observed: the low level decreased – in the control group by 9.09%, in the experimental group – by 35%; the number of students with an average level increased – in the control group by 9.09%, in the experimental group – by 25%; the number of students with a high level did not change in the control group, and in the experimental group it increased by 10%. Thus, the data of the experiment confirm the effectiveness of using virtual museums and excursions in the training of tourism specialists.

Table 1
The level dynamics of capturing the professionally-oriented knowledge of tourism specialists

Group			Control group (n = 22)		Experimental group (n = 20)	
Stage			Start	Finish	Start	Finish
Tests						
Levels	**Low**	Absolute	13	10	12	7
		%	59.09	45.5	60	35
		difference %	–13.59		–25	
	Medium	Absolute	7	9	6	9
		%	31.82	40.9	30	45
		difference %	+9.08		+15	
	High	Absolute	2	3	2	4
		%	9.09	13.6	10	20
		difference %	+4.51		+10	
Visual tests						
Levels	**Low**	Absolute	15	13	13	6
		%	68.18	59.09	65	30
		difference %	–9.09		–35	
	Medium	Absolute	6	8	6	11
		%	27.27	36.36	30	55
		difference %	+9.09		+25	
	High	Absolute	1	1	1	3
		%	4.55	4.55	5	15
		difference %	0		+10	

Calculated by the authors, 2022

Thus, the expediency of using virtual museums and excursions in the higher education process is determined by the relevance and novelty of this technology, the motivation of students' interests, the need for the development of creative abilities and the formation of professional competence. The experience of implementing these technologies in the process of studying tourism disciplines convincingly proves that they increase the information capacity of classes, make them more attractive and interesting for students. A virtual museum and a virtual excursion can also be considered as an effective organizational form of learning, in particular for the course of museum studies and similar disciplines.

We emphasize that the use of virtual museum tours in the educational process has its advantages and disadvantages. The advantages of this technology include many factors:

— accessibility (the opportunity for students, in particular students with disabilities or from low-income families, to see the best museums and their collections, masterpieces of world art, hear the best tour guides and the best tour texts);
— interactivity (students experience conditions close to real ones, having the opportunity to influence the course of the excursion);
— informativeness (receiving information about a given museum and any of its exhibits, and a significant share of visual information contributes to memorization);
— no time limits (possibility of viewing the exposition at any convenient time);
— safety ('traveling' behind a computer or smartphone monitor, the student avoids physical difficulties and danger, and the risk of an accident is minimal);
— reliability (obtaining information "first-hand");
— modernity (use of innovative methods and techniques, relevant for young people, Internet technologies for solving creative tasks).

The disadvantages of using virtual tours, in our opinion, are the dependence on technical factors, limited possibilities of the perception format (the maximum format is 3D), the low level of memorization of textual (logical) information, lack of feedback (communication with the tour guide, because most predominant tours are not online), labor-intensive (significant time spent on viewing and creation), low profitability (in the process of professional tourist activity).

Therefore, a virtual museum and a virtual excursion cannot completely replace real presence in a museum, although they provide an opportunity to get a general idea of the object under study. A full-fledged curriculum of the museum studies course involves real tours of real museums with an educational purpose, that is, an optimal combination of reality and virtuality in tours based on the interests of students and the tasks of the teacher.

Results

The new challenges of contemporary times lead to the development of new forms and methods of education. In the process of studying tourism disciplines, modern methods are actively used, in particular, the technologies of a virtual museum, a virtual tour, virtual excursions, etc. The teacher can choose different forms and methods of work with the use of museum resources: to conduct an overview and thematic virtual tour, to use the multimedia resources of the museum site to create an electronic database of visual aids, to organize workshops for students with virtual images of museum exhibits, to attract university students to the use of information resources of the museum in the process of performing search and research work.

During lectures, the teacher has the opportunity to conduct virtual tours to the best museums and galleries of the world for future tourism specialists using the tools of various platforms (Google Arts&Culture, Google Cultural Institute, etc.), select specific works of art from the catalog based on the subject of the lesson and show their fragments in high resolution. Virtual tours are one of the most effective and persuasive ways to present information, as they create the illusion of full presence in the viewer. Basically, this is a multimedia photo panorama where you can upload videos, graphics, text, links. At the same time, unlike a video or a regular series of photos, virtual tours are characterized by interactivity. In the process of traveling, you can zoom in or out on one or another object, meticulously examine individual details of the interior, view the panorama from afar, look up and down, approach the selected point or move away from it, move from one panorama to another through active zones, for example, walk through individual rooms, and all this can be done at the right pace and in an order convenient to a particular viewer. Thus, it is possible, for example, to go around the entire museum from the inside, inspect it from the outside, or take a virtual trip to an exotic island without leaving one's seat (Franchuk & Potapyuk, 2018).

The use of actual museum pieces constitutes a large value for studies. The institutionalization of museums as places of accumulation, storage and demonstration of past exhibits is a direct expression of this new method of history perception. In the last decades, the mushroom growth of copying-multiplying technique has been accompanied by numerous attempts to give to the past a new place in the present. Nowadays, museums that are original receptacles of knowledge actively digitize their exhibits in order to keep and demonstrate this knowledge to the visitors. The Internet, the network of knowledge, is used for distribution of information and, thus, offers new possibilities for expansion of museum information. Accordingly, the traditional museum model is on the path of transformation; more and more rarely it is a place bounded by solid walls. Digital displays are a new museum method to show their collections and open to the potential audience all over the world, offering it access to research and study of museum funds, in particular with an educational purpose. The array of instruments has been worked out lately, quite a few of which are public domain software that is of free access, and just the same tools give an opportunity to museums, libraries and other cultural institutions containing collections to create digital displays and show them in the online-mode (Islek &Asiksoy,2019). These are invaluable possibilities for perfecting modern teaching at universities under conditions of financial deficit. Modern technologies create numerous possibilities for organizing virtual interactive presentations and exhibitions that students benefit from.

An effective form of education is the use of virtual excursions, which, firstly, satisfies the teachers' needs for a more modern presentation of information, and secondly, the students' desire to get acquainted with the culture and art of different countries of the world. Thirdly, virtual excursions are more and more frequently performed with the use of VR technologies.

We use virtual tours in various ways: as part of a lecture when the teacher illustrates the studied material with the help of a virtual museum resources, or as part of a practical lesson. Moreover, this tool is used when students receive a specific task of creating a virtual trip, and it can also serve as a form of work organization for an individual student, aimed at in-depth study of a particular topic.

Virtual excursions can be used fragmentarily in different classes or in a series of classes on a certain topic. For example, when studying the discipline "Organization of tourism", the lesson "Organization of tourist trips in the museum" offers a virtual tour of the Louvre, which is one of the oldest, richest and largest museums in the world, a repository of collections of treasures of the most ancient civilizations, as well as a symbol of Paris and France.

Given the limited time allotted by the curriculum for viewing excursions, the teacher gives students a task of familiarizing themselves independently and analysing virtual tours of museums and online exhibitions such as Byzantine and Christian Museum (Athens, Greece), Cranbrook Museum of Art (Michigan, USA), Theater-Museum of Salvador Dalí (Catalonia, Spain), The Frick, Pittsburgh (Pittsburgh, Pennsylvania, USA), Hallville Museum (Stockholm, Sweden), Hermitage (St. Petersburg, Russia), Louvre (Paris, France), Marshall M. Fredericks Museum of Sculpture (Michigan, USA), Pitt Rivers Museum (Oxford, Great Britain), Sao Paulo Museum of Art (Sao Paulo, Brazil), Vatican Museums (Vatican City), Vizcaya Museum and Gardens (Miami, Florida, USA). Each student, having chosen a museum that interests them the most, presents it in a practical session and analyzes the quality of the virtual tour (Hagedorn-Saupe &Peukert, 2015).

In the process of organizing museum-educational activities, virtual resources create unique conditions for familiarizing oneself with museum collections and infrastructure, performing various tasks, and preparing for a real visit to the museum. For a teacher, virtual museums provide a significant amount of educational multimedia materials, contribute to the development of new teaching methods, provide an opportunity to fully communicate with their students, as well as evaluate students' academic performance and study their cognitive interests. Solving creative tasks with the use of virtual museums promotes the development of the following educational skills: selection of information, respectively, with a specific purpose and topic, public presentation of work results, drawing up a comparative analysis, monitoring and categorising information (Chiarenza, Accardi & Inglisa, 2019).

During the study of the topic "Peculiarities of tours in museums of the world", within the framework of independent work, students were offered to view virtual tours of the following famous museums: Canadian Museum of History (Gatineau, Canada), Cliff Castle Museum (Bradford, Great Britain), Diffenbunker (Ottawa, Canada), Florence as it was (Florence, Italy), Mount Vernon (Virginia, USA), Historic Ships of Baltimore (Baltimore, Maryland, USA), Seattle Aviation Museum (Seattle, Washington, USA), Museum of the American Revolution (Philadelphia, Pennsylvania, USA), National Archaeological Museum (Madrid, Spain), National Museum of the Great Lakes (Toledo, Ohio, USA), National Museum of the US Air Force (Dayton, Ohio, USA), Palace Museum: Forbidden City (Beijing, China); Pennsylvania Railroad Museum (Pennsylvania, USA), Monticello (Virginia, USA), Westminster Abbey (London, Great Britain). Afterwards, during the practical session, the museums and their collections which excited the students the most, as well as the quality of the excursions, were discussed. Viewing excursions is an effective form that contributes to the widest possible coverage of the world museum network, and in the process of discussion, the professional skills of future tourism specialists are formed.

Studying natural history museums, we use virtual excursions to the National Museum of Natural History (Luxembourg), National Museum of Computing (Great Britain), National Museum of Natural History (USA), Museum of Natural History of Oxford University (Great Britain).

Here is a short list of virtual tours of national museums that we use in the classes with tourism students: the Ulas Samchuk Museum, the Hetmanship Museum, the Kolomyia Museum of Folk Art of Hutsul Region and Pokuttia, the Vyacheslav Lipinsky Memorial Museum in the village of Zaturtsi, Museum of History of the Ostroh Academy, National Museum "Chernobyl", Museum of Modern Sculpture of Mykhailo Dzindra in Lviv, Museum of the Liberation Struggle of Yuriy Mykolskyi, Museum of Glass in Lviv, Museum of the Volyn Icon, Museum of History and Culture of the Jews of Bukovyna, House-Museum of Igor Stravinsky in Ustiluz , Kyril Razumovsky Palace in Baturyn, Historical and Archaeological Museum "Ancient Aratta – Ukraine" in the village of Trypilla, Memorial Museum "Prison on Lontsky" in Lviv, Museum of Archeology in Baturyn, Ivan Kotlyarevsky Manor Museum in Poltava, Literary and Memorial Museum Hryhoria Skovorody, historical and memorial museum of M. Hrushevskyi and others.

In the process of studying the museums of Ukraine, we invite students to watch the virtual tour "Museums of Ukraine in the open air" (https://museums.authenticukraine.com.ua/ua/), which was created as part of the "Authentic Ukraine" campaign by Google Ukraine together with the Ministry of Culture of Ukraine. Thanks to the project, seven museums were digitized. Students go on virtual tours to the National Museum of Folk Architecture and Lifestyle of Ukraine (Pyrogiv), the Museum of Folk Architecture and Lifestyle in Lviv

"Shevchenkivskyi Gai", the Museum of Folk Architecture and Lifestyle of the Central Dnipro Region (Pereyaslav-Khmelnytskyi), the Transcarpathian Museum of Folk Architecture and Lifestyle (Uzhgorod), "Mamaeva Sloboda" Folklore Center (Kyiv), Zaporizhia Sich – National Reserve "Khortytsia" (Zaporizhia), Residence of Bohdan Khmelnytskyi (Chhyryn). Thanks to modern technologies, it is possible to "walk" through the museums' territory, admire their surroundings, inspect their buildings and familiarize oneself with museum exhibits from the inside. It is advisable to analyze additional materials on the website (a map with digitized museums, for each of which a separate virtual journey has been created, textual information about folk architecture and everyday culture of the population), to pay attention to unique collections of ethnographic and architectural objects dating from the 15th–20th centuries. We also analyze the level of ease of navigation on the web portal (Daniela, 2020).

As experience shows, virtual excursions are successfully used in classes to attract students to the cultural heritage of Ukraine and the world. Possible variants of the task for studying the topic "Classification of Museums of Ukraine" can be as follows: the student chooses a profile of the museum and prepares an excursion using a virtual tour of the museum according to the appropriate plan, in which they justify the choice of the topic of the excursion, the selection of objects, write their description, create a route and excursion plan, prepare and process the text of the excursion.

With the help of virtual museum technology, university students have the opportunity to learn the methodology of organizing and conducting excursions for various destinations, because this is a necessary part of successful study of this academic discipline. This tool is implemented by students in their exploration of historical, natural, art and other museums, in the development of material, methods and technologies that can serve as a basis for creating and conducting future excursions, in particular, virtual ones.

The experience of students creating their own virtual museums and excursions is valuable, first of all, for practical purposes: this can be one of the practical individual tasks to be completed. To create virtual museum trips, students are advised to use different programs, in particular: izi.TRAVEL, or Google Arts&culture, ARCGIS and others (Table 2).

According to the results of the survey, the respondents most often use izi.TRAVEL, because this application is the easiest to use (Figure 1).

The development technologies of virtual museums (Fig. 2) are focused on the development of students' creative abilities, individualization of the educational process, formation of self-mastery skills and application of knowledge. For this, elements of distance learning are used, whose advantages are museum visits. This encourages students to develop independence and responsibility, which increases their motivation to study, as well as develops students' analytical

skills, creative abilities, and enriches the experience of working with modern technologies. And this, in turn, increases their qualifications and competitiveness in their future professional activities.

Table 2
Analysis of platforms for creating virtual museums

Program	Characteristics	Advantages	Disadvantages
GoogleArtProjekt/GoogleArts&Culture	The program has been operating since 2011, its partners are 17 world-known museums. Any user can access high-definition images of works of art stored in the program's partner museums. The platform allows users to take virtual tours of museum galleries, learn about physical and contextual information about works of art, and create their own virtual collections.	A large database	Focused mainly on museums and galleries
ArcGIS	With ArcGIS Online, you can create web maps, use ready-to-use resources, publish map services, perform spatial analysis, share data, and access maps from any device. The platform can be used as a platform to build your own geo-tethered applications. You can add shapefiles, spreadsheets, KML files, OGC WMS and WMTS services, map services, GeoRSS and GPS files, and easily combine data and maps provided by other users. It regularly updates the basemap gallery with resources from commercial data providers and verified community users around the world.	Free account. Easy to use.	Requires additional software (mainly focused on GIS).
izi.TRAVEL	The platform provides an opportunity to create virtual exhibitions using photo, audio and video files. Thanks to GPS, automatic playback of tour stories is possible. You can test your knowledge with the help of entertaining quizzes. Provides savings on roaming – audio guides can be downloaded to the phone before the trip. Quick access to local stories with QR codes and numeric keypad.	A program that unites guides and tourists from all over the world. Easy to use. Free.	The walking mode along a certain route works only online.

Developed by the authors, 2022

To develop a virtual museum trip, students need photos of the selected museum and its exhibits, a descriptive text about the selected objects, access to Google navigation, a selected application, and a smartphone.

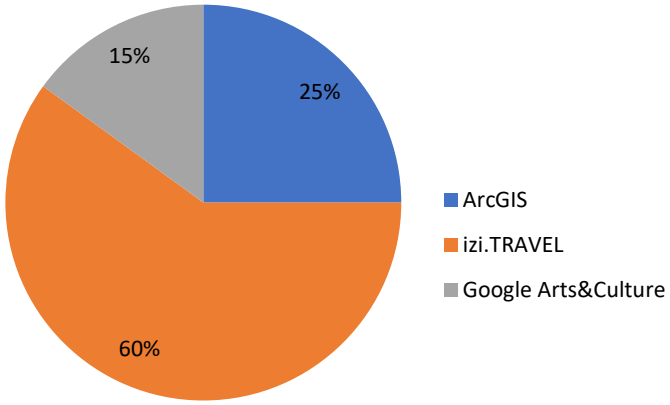

Figure 1
Use of special programs for the development of a virtual museum (2022)

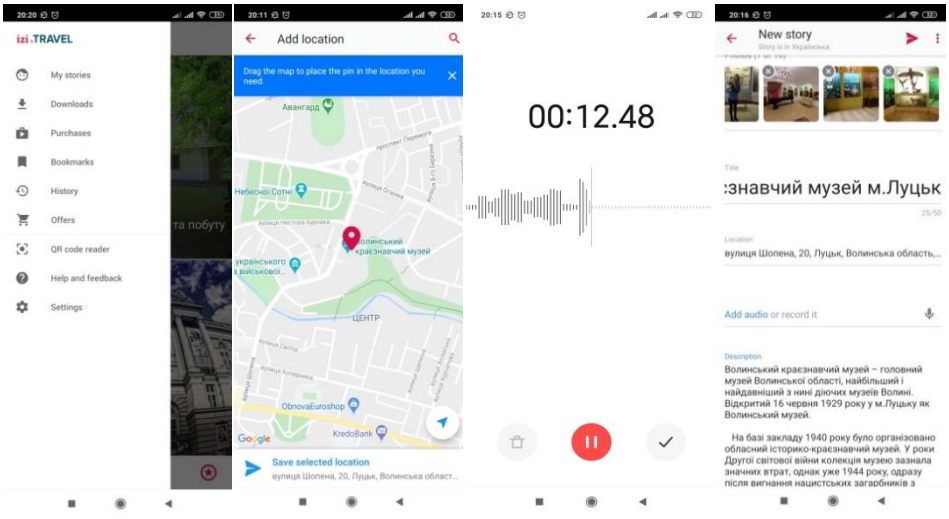

Figure 2
The development of virtual museums technologies

It is suggested that students create (individually or collectively) their virtual museum from scratch, choosing their own surroundings, an appropriate building, rooms, etc. Taking into account all pedagogical rules, this entertaining task has a considerable educational effect as it seems easy but it needs a lot of effort and allows students to develop their professional skills at the level required by the curriculum.

The creation of one's own virtual museum and excursion can be a task for current and final evaluation (by means of diagnosis) from the museum studies, however, it is necessary to work out the corresponding assessment criteria,

for example, planning quality, quality of the route, quality of the text, creativity and others.

Therefore, virtual museums are not only an effective educational resource, but also an effective center of interpersonal communication, an interactive learning environment that ensures the formation of students' knowledge through the development of imaginative, associative, abstract and critical thinking, promotes the growth of motivation and the expansion of the individual's worldview.

Discussion and conclusions

Virtual museums and excursions are today a new, relevant phenomenon in the information and communication space in general, and the information and educational environment in particular. They are inextricably linked with the development of the information society, active implementation of information and communication technologies, the processes of globalization of the world, and the improvement of the intellectual and cultural level of humanity. The introduction of virtual museums performs a number of important functions: scientific, cultural, educational, etc., which are aimed at preserving the most valuable memories and heritage of humanity, defining and recalling the axiological coordinates of its existence. These and similar achievements also demonstrate the humanistic aspects of modern society, because they enable travel for people with special needs – people with disabilities, low-income people and people with limited or enforced mobility restrictions.

In modern conditions, such technologies have acquired special importance for the training of tourism specialists, being implemented as means of training, evaluation, as well as education in various forms of teaching and student activities, as means of acquiring and developing general and professional competences necessary for work in the future. The use of the whole variety of types of virtual museums and excursions allows one to diversify the learning process, enliven the work of students in classes, promotes better assimilation of educational material, stimulates interest in the educational subject and generally in the chosen specialization, motivates tourism students to develop their creative potential, enriches and develops their professional erudition, etc. The study of virtual museums, excursions, tours, their creation and implementation is actually an important component within the course of museum studies. Having its advantages and disadvantages, the technology of virtual museums and excursions, rationally combined with the study of the work of traditional museum institutions, is naturally introduced into the process of training future tourism specialists.

The directions of further research, in our opinion, should be focused on the practical aspects of using virtual museums in the development of educational and research projects, production practice and the organization of distance learning.

STATEMENT OF ETHICS

This study was conducted in accordance with the World Medical Association Declaration of Helsinki. The research protocol was reviewed and approved by the Scientific and Technical Council of the Lutsk National Technical University (April 19, 2023, Lutsk, Ukraine). All participants provided written informed consent to participate in this study.

DECLARATION OF CONFLICTING INTERESTS

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