

DEVELOPMENT OF DIGITAL MUSEUMS AND VIRTUAL EXCURSIONS

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Abstract

The article analyzes the formation, development stages, and significance of digital museums and virtual excursions in modern society. The study highlights the digitalization of museum activities, the use of 3D technologies, virtual reality (VR), augmented reality (AR), and multimedia tools. Furthermore, the role of virtual excursions in promoting historical and cultural heritage, developing distance education opportunities, and increasing tourist flow is scientifically substantiated. The article also presents conclusions and recommendations regarding the influence of digital museums on the spiritual education of young people, international experiences, and the prospects for the development of virtual museum technologies in Uzbekistan.

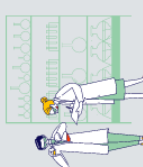
Keywords: Digital museum, virtual excursion, 3D technology, virtual reality, augmented reality, multimedia tools, digitalization, cultural heritage, interactive platform, museum tourism.

Introduction

Annotatsiya:

Raqamli muzeylar va virtual ekskursiyalarning shakllanishi, rivojlanish bosqichlari hamda zamonaviy jamiyatdagi ahamiyati tahlil qilingan. Tadqiqotda muzey faoliyatini raqamlashtirish, 3D texnologiyalar, virtual reallik (VR), kengaytirilgan reallik (AR) va multimedia vositalarining qo'llanilishi yoritilgan. Shuningdek, virtual ekskursiyalarning tarixiy-madaniy merosni keng targ'ib qilish, masofaviy ta'lim imkoniyatlarini rivojlantirish va turistlar oqimini oshirishdagi o'rni ilmiy jihatdan asoslab berilgan. Maqolada raqamli muzeylarning yoshlar ma'naviy tarbiyasiga ta'siri, xalqaro tajribalar hamda O'zbekistonda virtual muzey texnologiyalarini rivojlantirish istiqbollari yuzasidan xulosa va tavsiyalar keltirilgan.

Kalit so'zlar: Raqamli muzey, virtual ekskursiya, 3D texnologiya, virtual reallik, kengaytirilgan reallik, multimedia vositalari, raqamlashtirish, madaniy meros, interaktiv platforma, muzey turizmi



Аннотация:

В статье проанализированы процессы формирования, этапы развития и значение цифровых музеев и виртуальных экскурсий в современном обществе. В исследовании освещены вопросы цифровизации музейной деятельности, применения 3D-технологий, виртуальной реальности (VR), дополненной реальности (AR) и мультимедийных средств. Также научно обоснована роль виртуальных экскурсий в популяризации историко-культурного наследия, развитии дистанционного образования и увеличении туристического потока. В статье представлены выводы и рекомендации по влиянию цифровых музеев на духовное воспитание молодежи, международному опыту и перспективам развития технологий виртуальных музеев в Узбекистане.

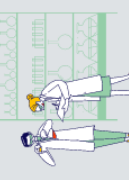
Ключевые слова: Цифровой музей, виртуальная экскурсия, 3D-технология, виртуальная реальность, дополненная реальность, мультимедийные средства, цифровизация, культурное наследие, интерактивная платформа, музейный туризм.

INTRODUCTION

In the 21st century, the rapid development of information and communication technologies has led to fundamental transformations in museum activities as well. As a result, digital museums and virtual excursions have become modern forms of preserving and promoting cultural heritage. Historically, the first virtual museum projects emerged in the 1990s in the United States and European countries alongside the development of internet technologies. Today, according to UNESCO data, a significant proportion of the more than 95,000 museums worldwide operate on the basis of digital platforms[1]. Especially during the 2020 pandemic, the demand for virtual excursions increased sharply, leading many museums to introduce online services. According to statistical data, the number of users of virtual museum platforms increased by 60 percent in 2021 [2]. In Uzbekistan, the processes of museum digitalization have also accelerated in recent years. Major museums in Samarkand, Bukhara, Khiva, and Tashkent have introduced 3D excursions, QR-code systems, and multimedia technologies. This process plays an important role in promoting cultural heritage on a global scale, increasing young people's interest in history, and developing tourism [2].

DISCUSSION AND RESULTS

The development of digital technologies in the 21st century has deeply penetrated all spheres of society, and this process has also had a significant impact on the development of culture and the museum sector. In particular, the digitalization of museum activities, virtual excursions, 3D modeling, and the application of Virtual Reality (VR) and Augmented Reality (AR) technologies have fundamentally transformed the traditional functions of museums. Historically, museums operated for a long time as traditional institutions responsible for preserving and displaying exhibits. Today, however, they are becoming interactive information centers, educational platforms, and tools of virtual communication. In this regard, the scientific

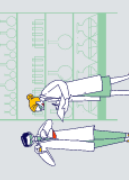


analysis of the development of digital museums and virtual excursions has become one of the important directions of modern museology [3].

The first virtual museum projects were established in the 1990s in the United States and European countries. As a result of the development of internet technologies, the world's leading museums began to present their exhibits in electronic form. For example, Louvre Museum in France, British Museum in the United Kingdom, and Metropolitan Museum of Art in the United States created their first virtual catalogs between 1995 and 2000. During this period, digital archiving systems also emerged, making it possible to preserve museum exhibits in electronic form. According to statistical data, by 2005 more than 10,000 museums worldwide had established their own platforms on the internet [4]. As of 2024, more than 95,000 museums are operating worldwide, and a large proportion of them have introduced digital services. Analysis shows that the pandemic period gave a strong impetus to the development of digital museums. In 2020, due to the COVID-19 pandemic, more than 90 percent of museums around the world were temporarily closed. As a result, virtual excursions and online exhibitions were organized in order to maintain museum activities [5]. According to UNESCO data, the number of visitors to virtual museum platforms increased by 60–70 percent during the pandemic period. For example, more than 21 million users visited the virtual tour platform of the Louvre Museum in 2020. This figure was several times higher than the number of traditional visitors. Thus, virtual excursions emerged as a new form of museum communication [6]. In Uzbekistan, the processes of modernization and digitalization of museum activities have been implemented since the years of independence. The adoption of the Law “On Museums” in 1998 strengthened the legal foundations of museum activities. After 2017, within the framework of reforms in the cultural sphere, special attention was paid to the digitalization of museums, the creation of electronic catalogs, and the organization of virtual excursions. At present, more than 120 state museums operate in Uzbekistan. These museums preserve more than 2.5 million historical exhibits. In recent years, major museums in Tashkent, Samarkand, Bukhara, Khiva, and Termez have introduced QR-code systems, audio guides, interactive screens, and 3D technologies [6].

Scientific analyses show that digital museums play an important role in increasing young people's interest in history and culture. Compared to traditional exhibitions, presentations based on interactive technologies attract greater attention. According to research findings, the level of retaining historical information among visitors is 40 percent higher in museum exhibitions where multimedia technologies are used [7]. In particular, virtual reality technologies make it possible to vividly visualize historical events. For example, observing models of the ancient cities of Samarkand or Khiva through VR technology enables users to experience the historical atmosphere more realistically.

Virtual excursions are also being widely applied in the education system. In recent years, schools and higher educational institutions have begun actively using virtual museum platforms. This process contributes to the development of distance education. According to statistical data, in 2023 nearly 35 percent of users of virtual museum platforms in Uzbekistan consisted of students and pupils. Thus, digital museums are becoming an important instrument



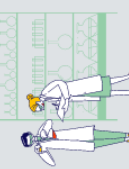
for the integration of education and science [8]. The economic efficiency of digital museums is also one of the important issues. In traditional museum activities, the number of visitors is limited by territorial opportunities. Virtual platforms, however, make it possible to serve millions of users simultaneously. According to statistical data, in 2022 more than 500 million users worldwide utilized museum services through major virtual museum platforms. This creates opportunities for generating additional economic income through advertising, electronic tickets, and online services.

The application of AR and VR technologies in museums has fundamentally changed the methods of presenting exhibits. For example, the original appearance of ancient architectural monuments can be demonstrated through virtual reconstruction. This is especially important in studying historical objects that have been destroyed or only partially preserved. In Uzbekistan, work on 3D modeling of certain historical monuments is also being carried out. In particular, virtual models of the Ulugh Beg Observatory in Samarkand and the ancient city of Termez have been created [9]. The issue of personnel training is also of great importance. A modern museum specialist must possess deep knowledge not only of history, culture, and art, but also of information technologies. For this reason, the field of “digital museology” is being developed in many countries. In Uzbekistan, special courses on museum management and digital technologies are being introduced at the Uzbekistan State Institute of Arts and Culture and other higher educational institutions [10].

In conclusion, digital museums and virtual excursions have become an important direction of modern museology. The technological reforms implemented in recent years are contributing to the enhancement of the scientific, cultural, and educational potential of museums. In Uzbekistan, the processes of museum digitalization, the development of virtual platforms, and the introduction of multimedia technologies are also accelerating. As a result, museums are becoming not only institutions for preserving historical heritage, but also important components of the global information and communication system.

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