

Торайғыров университетінің
ҒЫЛЫМИ ЖУРНАЛЫ

НАУЧНЫЙ ЖУРНАЛ
Торайғыров университета

ТОРАЙҒЫРОВ УНИВЕРСИТЕТІНІҢ ХАБАРШЫСЫ

Педагогикалық сериясы
1997 жылдан бастап шығады



ВЕСТНИК ТОРАЙҒЫРОВ УНИВЕРСИТЕТА

Педагогическая серия
Издается с 1997 года

ISSN 2710-2661

№ 3 (2025)

Павлодар

НАУЧНЫЙ ЖУРНАЛ
Торайгыров университета

Педагогическая серия
выходит 4 раза в год

СВИДЕТЕЛЬСТВО

о постановке на переучет периодического печатного издания,
информационного агентства и сетевого издания

№ KZ03VPY00029269

выдано

Министерством информации и коммуникаций
Республики Казахстан

Тематическая направленность

публикация материалов в области педагогики,
психологии и методики преподавания

Подписной индекс – 76137

<https://doi.org10.48081/JWNE6227>

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ОҚЫТУДЫҢ ТЕОРИЯСЫ МЕН ӘДІСТЕМЕСІ

SRSTI 14.01.11

<https://doi.org/10.48081/ПОHP3619>

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MUSEUMS' CULTURAL AND EDUCATIONAL POTENTIAL IN BIOLOGY INSTRUCTION

Contemporary museums and educational institutions share similar operational methods and possess chances for collaboration and engagement. University and school museums, along with historical and local history institutions, possess valuable experience in orchestrating cultural and educational activities, serving as distinctive platforms for the execution of educational programs, lessons, and extracurricular endeavours (such as excursions, lectures, exhibitions, local history trips, and the implementation of school scientific projects within museums). The museum exhibition emphasises the representation of natural things within specific natural environments. Their structure and content replicate natural processes within the ecosystem, facilitating a comprehensive examination of biological patterns, the establishment of a scientific perspective, and the enhancement of students' cognitive engagement. This offers options for implementing museum lessons on biology and extracurricular activities. The article analyses data from the practical experiences of 90 teachers regarding their competence in utilising the resources of natural science

museums within the educational process, their perceptions of the role of these museums in enhancing students' knowledge quality, and their understanding of the organisation of collaboration between schools and museums. Educators favourably assess the incorporation of natural objects in the educational process for cultivating topic knowledge and enhancing students' cognitive engagement. The findings of the performed investigations indicated an issue in the relationship between museums and schools, highlighting the necessity for teacher training in utilising natural science museum holdings.

Keywords: museum, educational potential, learning, natural science collections, school.

Introduction

The advancement of societal cultural competence relies on the integration of culture and education. The resolution to the issue lies in the cultivation of creatively inclined individuals possessing a high cultural standard. This necessitates the extensive utilisation of the instructional resources offered by the biology museum and school.

Currently, the museum sector plays a crucial role in the acquisition of cultural values, the dissemination of scientific knowledge regarding regional nature, the generation of new research data, and the protection of heritage assets. Recognising the pivotal role of culture in the advancement of humanity and the preservation of the environment is of paramount significance [1, p. 175].

Global practices indicate that natural science collections in museums play a pivotal role in educational endeavours, aiding in the development of a scientific worldview among youth and facilitating the broad distribution of natural science knowledge. The evolution of contemporary museums, where science, education, and innovation converge, is a topic of discourse at conferences and symposia [2].

The significance of this process is influenced by the present phase of spiritual rejuvenation within Kazakhstani society, evident in the enhancement of national identity and a heightened interest in both tangible and intangible cultural heritage, traditional values, and comprehensive examination of Kazakhstan's natural features. In light of emerging societal realities, museums in all domains must ascertain their position in educational and developmental activities. This necessitates the adaptation of their functions to contemporary societal demands, the enhancement of cultural and educational potential, and the implementation of innovative methodologies designed to augment the educational and scientific capacities of museums, thereby fostering a more profound comprehension and awareness of natural and historical processes within the realm of natural sciences.

Museums and natural science collections can foster cultural development and enhance the quality of biological education by providing opportunities for skill development, information organisation, and the establishment of cultural values, while significantly impacting cognitive development [3, p. 186].

In domestic education, museum pedagogy is a crucial facet of practical collaboration between schools and museums, possessing considerable potential for integrating humanitarization into the instruction of natural sciences. This collaboration between a museum and an educational institution is pertinent, as the cultural and natural legacy exhibited in museum collections remains inadequately incorporated into pedagogical practice. This is partially attributable to the inadequacy of teachers in successfully using the instructional resources provided by biological exhibits in museums. In the contemporary media landscape, the active utilisation of artificial intelligence and other novel technologies is fostering the emergence of new interaction models between museums and educational institutions [4, p.154–155].

Materials and methods

A review of pedagogical, practical, scientific, and methodological literature on museology was conducted to assess the cultural and educational potential of museums. The analysis utilised data gathered by the authors from 2014 to the present regarding the organisation of educational activities in the exhibitions of historical and local history, university, and school museums in Northern and Eastern Kazakhstan.

A survey of natural science educators and museum personnel was done to evaluate the utilisation of natural science museum resources in educational activities. An evaluation of the theoretical material and practical experience of 90 educators enables us to draw valid conclusions and affirm the reliability of the results achieved.

The primary materials consisted of natural science collections showcasing contemporary specimens (including taxidermied animals and systematic collections in malacology, entomology, ornithology, botany, etc.) and fossilised flora and fauna (paleontological discoveries) from the region, displayed in museum exhibitions and reserves.

Excursion methodologies were employed extensively: visits to museums and historical or natural locations, followed by surveys of participants.

Results and discussion

Museum biological exhibits serve as repositories of natural science knowledge for visitors. Facilitating educational and cognitive trips to natural places or local history museums necessitates a specific level of training for both the educator and the guide. This assumes an understanding of the traits of regional flora and fauna,

along with a fresh perspective on the exhibition as a designed educational setting. Museum displays and natural artefacts can enhance local historical understanding and cultural awareness among the populace if an educated and seasoned guide serves as an intermediary between individuals, history, and nature. A crucial prerequisite for undertaking such excursions is the selection of engaging knowledge and captivating, attention-grabbing facts.

The regional museums in Northern and Eastern Kazakhstan feature biological expositions comprising systematic collections of regional flora and animals, landscape dioramas, and the paleontological history of the area. A visit to the museum serves as an efficient educational instrument for enhancing cultural identity awareness, acquiring historical knowledge, cultivating aesthetic appreciation, and improving scientific comprehension. The research of these museums experiences reveals distinct areas of museum and pedagogical instructional operations.

- museums are a scientific base for the implementation of educational and scientific projects of students;
- thematic excursions;
- lectures (“The Origin of Life on Earth” - experience of the Kustanai, North Kazakhstan and Pavlodar Historical and Local History Museums, “Traces of Unseen Animals” – experience of the museum complex of the Pavlodar Pedagogical University);
- expeditions, local history hikes;
- eco-workshops;
- participation of the museum in students’ field practices;
- creation of living corners for keeping animals (aquariums, exoterrariums) on the basis of museums;
- organization of exhibitions («Live tropical butterflies» Museum ERTIS, Pavlodar).

Regional museums and educational institutions possess valuable experience in facilitating extracurricular and supplementary educational activities through creative tasks, fostering a lasting interest and receptiveness to scientific study among schoolchildren, thereby playing a pivotal role in fulfilling the objectives outlined in international standards governing natural science education [5, p. 70–74].

International museums exhibit comparable experiences. Consequently, one of the prominent museums in the USA – the Metropolitan (established in 1870) has delineated educational objectives in its Charter. It is a norm among American museums. The amalgamation of several methodologies for engaging with visitors is manifested through museum courses, seminars, theatrical performances, case studies, and other educational events [6, p.2]. American art institutions, such as

the University of Miami, offer a K-12 program tailored for schoolchildren. This program addresses the educational requirements of students and encompasses courses in both natural sciences and humanities, accommodating various levels of proficiency [7].

Both international and national experience demonstrates that contemporary museums possess significant cultural and educational pedagogical potential for the teaching community. Teachers must comprehend contemporary trends in biological sciences, particularly the utilisation of museum collections in palaeontology, ornithology, ichthyology, entomology, malacology, and other related fields.

A Google quiz was created for teachers to evaluate their awareness and the significance of utilising museum resources in educational practice.

The poll included 90 participants instructing biology at secondary comprehensive schools, lyceums, and gymnasiums for gifted students in Pavlodar and the surrounding region. The poll was additionally extended to biology educators in Astana and the Akmola district. The questionnaire comprised 20 questions designed to assess teachers' proficiency in utilising museum collections within the educational framework, to elucidate the role of natural science museums in enhancing students' knowledge quality, and to investigate the organisation of collaboration between schools and museums.

Let us examine the outcomes of the responses to the enquiries in Block 1. Figures 1 and 2 indicate that 43% of teachers are inadequately prepared to utilise the museum's potential in their work, despite 24% recognising that this potential exists but remains underutilised.



Figure 1 – Implementation of educational opportunities of the museum in teaching biology

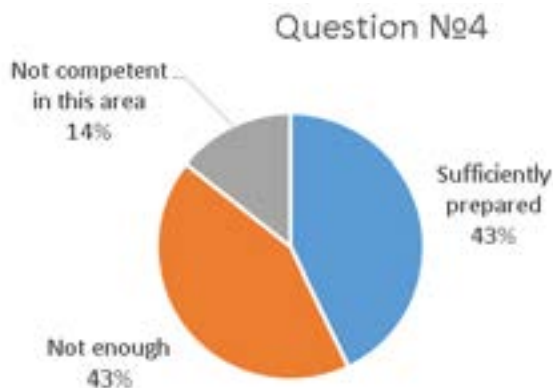


Figure 2 – Level of competence in using museum exhibits in educational work

The responses to the enquiries in the second section, which pertain to the student's engagement with the museum, indicate that educators acknowledge the significance of the museum's involvement in the educational process. Simultaneously, numerous educators observe that they lack the requisite expertise to effectively integrate museum resources and concepts into their instructional practices.

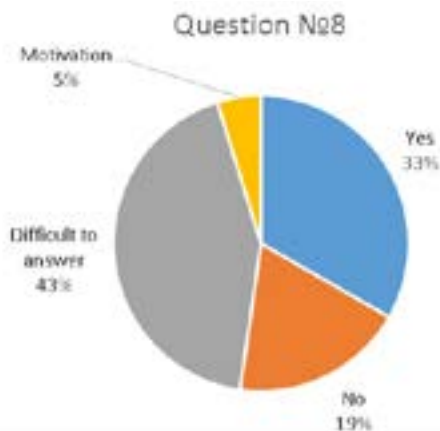


Figure 3 – Schoolchildren's interest in classes and excursions to the museum

The efficacy of utilising museums to enhance biology education for students is contingent upon various elements and criteria. Motivation is essential for both students and educators. When enquired about the necessity and inclination for students to visit a museum, a majority of teachers struggled to respond, with 43 % indicating uncertainty (Fig. 3). The motivation of the surveyed teachers is elevated, reaching 71 %. The majority of respondents regard a museum visit as a crucial component of the educational process, with 58 % of teachers acknowledging the high efficacy of this method (Fig. 4).

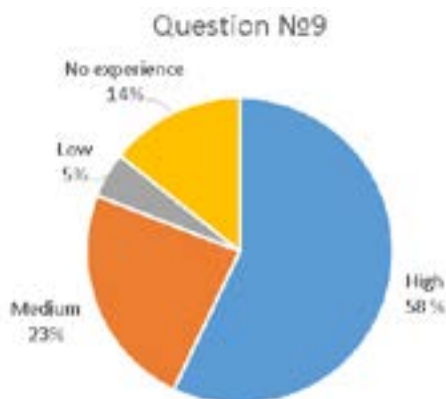


Figure 4 – Based on your experience of conducting excursions to museums, evaluate their effectiveness.

Visits to museums are predominantly arranged in conjunction with notable dates and holidays (such as Bird Day, Water Day, Environmental Protection Day, etc.) and constitute 23 % of extracurricular activities. At the planning stage, there exists a disorganised approach, characterised by the absence of prioritisation for teachers, which is regarded as a responsibility for particularly educated educators in supplementary education. The necessity for these educators is evident, and several universities, such as Pavlodar Pedagogical University named after Alkey Margulan, have established and are executing the educational program «Biology and the Teacher of Additional Education».

Upon evaluating the significance of collaboration between the school and the museum, along with the teacher's role in orchestrating museum events, educators observe a deficiency of interest from both parties regarding the «school-museum» relationship; this viewpoint is held by 71 % of respondents. Museum workers must

play a crucial role in addressing this issue, as their specialised training is essential for good collaboration – 35 % (Fig. 5).

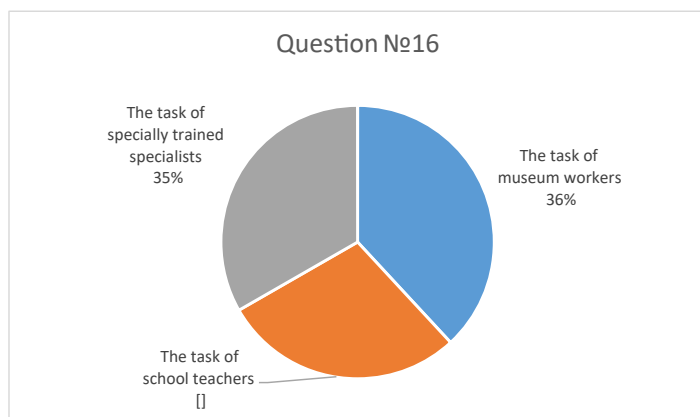


Figure 5 – Interaction «school – museum»

The study results indicate that the majority of instructors recognise the efficacy of utilising the museum's cultural and educational resources in the teaching process, observing that it is not fully leveraged. Insufficient ability to facilitate mutually advantageous interactions and the requirement for expert support are observed.

The responses to the second block of the questionnaire about teachers' evaluations of the significance of natural science museums for pupils indicate the following aspects:

- insufficient motivation and inadequate abilities for functioning in a museum setting;
- Beneficial outcomes from educational sessions at museums, resulting in enhanced knowledge quality;
- students' interest and enthusiasm to attend museums.

An examination of the responses to the enquiries in the third block identified principal factors that obstruct effective collaboration between museums and schools, notably the following:

- insufficient interest and motivation from both educators and museum personnel;
- Challenges in coordinating trips and educational programs within the museum.

Schools face challenges in modifying their extracurricular activities due to several factors: the museum's distance from the school, financial expenses for transport, admission, and thematic excursions, as well as the students' burden from supplementary education. Consequently, the acquired data are anticipated and validate that the potential of the natural science museum is not fully utilised. This is attributable to several factors:

- insufficient professional training of educators for the museum context;
- challenges in addressing the educational requirements of pupils through museum pedagogy.

The results obtained are corroborated by the research conducted by Kazakhstan authors examining the issues of interaction between museums and educational institutions in the historical context. The absence of comprehensive methodological manuals is identified as a key issue [8, p. 314]. The integration of the course «Museum Pedagogy» into modern education indicates a possible progression in museum pedagogical theory and practice. [9, p. 37]. Consequently, museums are currently regarded as one of the most significant avenues for enhancing education and culture, both in Kazakhstan and internationally [10, p. 100].

Conclusions

The partnership between the museum and the educational organisation across all levels, particularly within contemporary educational programs, facilitates the effective use of museum collections as a substantial enhancement to conventional classes and other pedagogical approaches. A primary focus of museum operations is cultural, educational, and enlightening initiatives.

Domestic and international museums have garnered valuable experience collaborating with educational institutions through excursions, talks, exhibitions, local history expeditions, and the execution of school scientific projects inside museum settings. Museums not only study and preserve but also offer opportunities to utilise cultural and natural heritage in the educational process, serving as a unique material resource and visual aid in both academic and recreational activities.

In the pedagogical practices of educational institutions, the potential of natural science exhibitions in museums remains underexploited, as evidenced by the following factors:

- inadequate qualifications of educators for engagement in the museum sector;
- ineffective fulfilment of students' educational needs via museum collections;
- involvement of educators and students in supplementary educational and extracurricular activities.

The data indicates the interest of kids in biological museum excursions and the necessity for teachers seeking extra training in museum pedagogy. This may encompass specialised courses focused on the comprehensive examination

of the potential inherent in natural science museum collections, including an introduction to methodological approaches and characteristics of museum education implementation.

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Received 18.03.25.

Received in revised form 11.04.25.

Accepted for publication 27.06.25.

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18.03.25 ж. баспаға түсті.

11.04.25 ж. түзетулерімен түсті.

27.06.25 ж. басып шығаруға қабылданды.

БИОЛОГИЯНЫ ОҚЫТУДА МҰРАЖАЙЛАРДЫҢ МӘДЕНИ-БІЛІМ БЕРУ ӘЛЕУЕТІН ПАЙДАЛАНУ

Қазіргі заманауи мұражайлар мен білім беру ұйымдарының жалпы жұмыс нысандары иеленеді және тығыз ынтымақтастық пен өзара әрекеттесу үшін мүмкіндіктері бар. Тарихи-өлкетану, жогары оқу орындары мен мектеп мұражайлары мәдени-білім беру қызметін ұйымдастыруда оң тәжірибеге ие және білім беру бағдарламаларын, сабақтарды және сыныптан тыс жұмысты (экскурсиялар, дәрістер, көрмелер, өлкетану жорықтары, мұражайлар базасында мектептің ғылыми жобаларын орындау) іске асыру үшін бірегей алаң болып табылады. Мұражай экспонаты жекелеген табиғи жағдайларда табиғи объектілерді бейнелеуге бағытталған. Олардың құрылымы

мен мазмұны экожүйедегі табиғи процестерді модельдейді, бұл биологиялық заңдылықтарды терең зерттеуге, ғылыми дүниетанымның қалыптасуына және студенттердің танымдық белсенділігінің дамуына ықпал етеді. Мақалада 90 педагогтың оқу процесінде жаратылыстану ғылымы мұражайларының әлеуетін пайдалану жөніндегі құзыреттілігі, оқушылардың білім сапасын жақсартудағы жаратылыстану ғылымы мұражайларының рөлін мұғалімдердің түсінуі және мектеп пен мұражай арасындағы өзара іс-қимылды ұйымдастыруды түсіну мәселелеріндегі практикалық тәжірибесінің деректері пайдаланылды. Мұғалімдер пәндік білімді қалыптастыру және білім алушылардың танымдық белсенділігін дамыту үшін білім беру процесінде табиғи объектілерді пайдалануды оң бағалайды. Жүргізілген зерттеулердің деректері мұражай мен мектептің өзара іс-қимылы саласындағы проблеманы анықтады, педагогтарды жаратылыстану-ғылыми мұражай коллекцияларымен жұмыс істеуге дайындау қажеттігін көрсетті.

Кілтті сөздер: мұражай, білім беру әлеуеті, оқыту, жаратылыстану ғылыми коллекциялар, мектеп.

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Поступило в редакцию 18.03.25.

Поступило с исправлениями 11.04.25.

Принято в печать 27.06.25.

ИСПОЛЬЗОВАНИЕ КУЛЬТУРНО – ОБРАЗОВАТЕЛЬНОГО ПОТЕНЦИАЛА МУЗЕЕВ В ОБУЧЕНИИ БИОЛОГИИ

Современные музеи и организации образования имеют общие формы работы и имеют возможности для тесного сотрудничества и взаимодействия. Историко – краеведческий, вузовские и школьные музеи имеют положительный опыт в организации культурно-образовательной деятельности и являются уникальными площадками для реализации образовательных программ, уроков и внеклассной работы (экскурсии, лекции, выставки, краеведческие

походы, выполнение на базе музеев школьных научных проектов). Музейное экспонирование ориентированно на отражение природных объектов в отдельных природных условиях. Их структура и содержание моделируют естественные процессы в экосистеме, что способствует углубленному изучению биологических закономерностей, формированию научного мировоззрения и развитию познавательной активности обучающихся. Это дает возможности для проведения музейных уроков по биологии и внеклассных мероприятий. В статье использованы данные практического опыта 90 педагогов в вопросах их компетентности по использованию в учебном процессе потенциала естественнонаучных музейных, на понимание учителями роли естественнонаучных музеев в улучшении качества знаний учеников и на понимание организации взаимодействия между школой и музеем. Педагоги положительно оценивают использование природных объектов в образовательном процессе для формирования предметных знаний и развития познавательной активности обучающихся. Данные проведенных исследований выявили проблему в сфере взаимодействия музея и школы, показали необходимость в подготовке педагогов к работе с естественнонаучными музейными коллекциями.

Ключевые слова: музей, образовательный потенциал, обучение, естественнонаучные коллекции, школа.

Теруге 25.08.2025 ж. жіберілді. Басуға 30.09.2025 ж. қол қойылды.

Электронды баспа

4,19 Kb RAM

Шартты баспа табағы 35,56.

Таралымы 300 дана. Бағасы келісім бойынша.

Компьютерде беттеген З. Ж. Шокубаева

Корректорлар: А. Р. Омарова, Д. А. Қожас

Тапсырыс № 4441

Сдано в набор 25.08.2025 г. Подписано в печать 30.09.2025 г.

Электронное издание

4,19 Kb RAM

Усл.п.л. 35,56. Тираж 300 экз. Цена договорная.

Компьютерная верстка З. Ж. Шокубаева

Корректоры: А. Р. Омарова, Д. А. Қожас

Заказ № 4441

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