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Museum educational activities in the context of disseminating modern scientific knowledge

Освітня діяльність музеїв у контексті поширення сучасного наукового знання

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Abstract

The purpose of the study is to analyse the content and focus of the educational activities of museums on the dissemination of modern scientific knowledge and ideas of scientific education. Scientific education is increasingly acquiring interdisciplinary and integrative content as a synthesis of natural, technical, and humanitarian knowledge in formal, non-formal, and informal education, or in conditions of their complementary integration. The authors conducted an online survey of 42 respondents (teachers of Ukrainian secondary schools, teachers of universities, and museum workers) who answered 10 questions of the questionnaire about the organization, drafting, and implementation of museum educational (museum pedagogical) programmes to communicate with pupils and students in the museum environment with the opportunity to express their own attitude to the suggested problems. The survey results proved that

Анотація

Метою дослідження є аналіз змісту та спрямованості освітньої діяльності музеїв щодо поширення сучасних наукових знань та ідей наукової освіти. Наукова освіта все більше набуває міждисциплінарного та інтегративного змісту як синтез природничого, технічного та гуманітарного знання у формальній, неформальній, інформальній освіті, або в умовах їх комплементарної інтеграції. Автори провели онлайн-опитування 42 респондентів (вчителів українських загальноосвітніх шкіл, викладачів ЗВО та музейних працівників), які дали відповіді на 10 питань анкети щодо організації, проектування та впровадження музейних освітніх (музейно-педагогічних) програм задля комунікації з учнями та студентами у просторі музею з можливістю висловити власне ставлення до запропонованої проблематики. Результати опитування довели, що вчителі загальноосвітніх шкіл, викладачів ЗВО мають значний інтерес щодо

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teachers of secondary schools and teachers of higher education institutions have a significant interest in the introduction of educational (museum pedagogical) programmes into the environment of national museums with minor visiting reservations, associated with quarantine restrictions during the COVID-19 pandemic. The article analyses the peculiarities of functioning of museum institutions in the system of organizing various types of educational activities with visitors in accordance with the dominant paradigm of education and upbringing. The role and significance of the most important educational paradigms in the system of museum pedagogical activity are outlined. The role of modern museums in promoting and disseminating ideas of scientific knowledge in various forms and methods of work with young people is emphasized.

Keywords: museum, educational activity, museum pedagogy, educational paradigm, scientific knowledge.

впровадження освітніх (музейно-педагогічних) програм у простір вітчизняних музеїв із незначними застереженнями щодо відвідування, що пов'язано з карантинними обмеженнями під час пандемії COVID-19. У статті проаналізовано особливості роботи музейних закладів у системі організації різних видів освітньої діяльності з відвідувачами відповідно до домінуючої парадигми навчання і виховання. Окреслено роль і значення найвагоміших освітніх парадигм у системі музейно-педагогічної діяльності. Акцентовано на ролі сучасних музеїв у популяризації й поширенні ідей наукового знання у різних формах і методах роботи з молоддю.

Ключові слова: музей, освітня діяльність, музейна педагогіка, освітня парадигма, наукове знання.

Introduction

The key characteristics of the development of the educational sector at the beginning of the 21st century have undergone many changes and transformations due to cardinal transformations of the very nature of learning, focused on independent acquiring of knowledge through various studies, a wide interdisciplinary awareness of a child in various areas of life, changes in the educational paradigm, and the spread of ideas of scientific education.

The organization of the learning process in educational institutions is increasingly taking into account the contexts of informality, creativity, critical thinking, visualization, interactivity, which leads to seeking the environment of an informal institution – a museum.

It is the pedagogical potential of the museum as an environment of effective informal communication in today's conditions that has inexhaustible reserves and opportunities that can radically reorganize the educational process, make it more meaningful, focused, exciting, and informative for each child.

The necessity of this study is due to the need to determine the peculiarities of the development of one of the most popular areas of modern museum and pedagogical activity – science education, the main postulates of which are implemented in modern centres of science and technology, research on museum pedagogy covers many areas of human life, helping to comprehend different contexts of its activity by means of the museum when creating an appropriate environment that can have an educational, social, didactic, therapeutic, adaptive, cognitive colouring and promotes personal development.

The article will reveal the importance of scientific education as a system of creative thinking in the formation of a person's scientific culture, study the role of educational activities of museums in the process of disseminating scientific knowledge, analyse the results of a survey on the effectiveness and possibilities of implementing educational programmes in museum practice, and explore the importance of museum pedagogy in the context of disseminating modern scientific knowledge, focusing on the role of museum (museum-pedagogical) programmes.

Literature Review

The issues raised are considered fragmentarily in the scientific literature and reflected, in particular, in the works by M. Xanthoudaki, B. Tirelli, P. Cerutti, & S. Calcagnini (2007), Yu. Hotsulyak, & M. Halchenko (2016), N. Polikhun, I. Slipukhina, & I. Chernetskyi (2018), however, they require special extended research.

In our opinion, these scientific works do not fully address the issue of educational activities of museums in the context of science education, as they are more concerned with general issues of science education. considering it as a system of innovations, the importance of interdisciplinary pedagogical research and the general goals of implementing the ideas of science education in the museum space, without sufficiently outlining practical recommendations. In our study, we will fill this gap by analysing the different vectors of educational activities of museums in the context of disseminating modern scientific knowledge and ideas of science education.

Scientific education can be identified with a purposeful system of formation of creative scientific thinking in the process of obtaining subjectively and objectively new knowledge by the methods of scientific cognition.

In particular, this concept is interpreted as:

- The highest level of professional education (obtained in postgraduate, doctoral studies, etc.).
- Scientific content of education (didactic principle of scientificity).
- An innovative pedagogical paradigm for the integration of education and science, which seeks to bring the educational activities of pupils as close as possible to the research activities, to involve them in solving educational and real scientific problems (Hotsulyak, & Halchenko, 2016, pp. 5–11).

The latter definition is of fundamental importance for us, because any innovative activity in the museum environment is to some extent always associated with the organization of research work of pupils and students in the process of studying a scientific phenomenon, discussing the results of experience, analysing the phenomenon.

The complexity of scientific education is expressed in the cross-cutting, interdisciplinary, and integrative nature of its content and is implemented with an emphasis on the natural sciences and their combination with other academic disciplines, on the synthesis of natural, technical, and humanitarian knowledge in the system of formal, non-formal, and informal education, or in conditions of their complementary integration.

The educational process of scientific education is associated with problematic, research, and project-oriented teaching methods, and dynamic curricula that are pedagogically adapted to different age categories (Hotsulyak, & Halchenko, 2016, pp. 5–11).

Researchers interpret scientific education as a scientific culture of an individual, the purpose of which is to attract the individual to the cultural values of science; a special kind of cognitive activity aimed at formation of the personality of an experimenter, researcher, scientist; a purposeful process of learning and education based on modern achievements of science, engineering, and technology in order to obtain knowledge and develop skills, as well as to form general cultural and professional competencies in the modern information society for personal self-realization and development of society as a whole (Polikhun et al., 2018, p. 187).

What is the fundamental difference between scientific knowledge and information and general knowledge? First of all, it is the systematization of results, structuredness and verifiability, which determine its authenticity, reliability, and credibility. Therefore, in the process of learning, unverified general knowledge is often rewritten from one manuscript to another, leading to misunderstanding and lack of realizing the meaning of what the subject of teaching is, what the expected results are, etc.

We can see a similar situation in the museum pedagogy, because the meaning of this concept is mostly perceived on the basis of the traditional approach to understanding pedagogical activity in various areas of human knowledge, based on a knowledge-oriented educational paradigm, as well as without taking into account the various contexts of its application and interrelation with related museum pedagogical concepts and categories.

Indirect, incompletely clear and delimited understanding of the content and nature of museum pedagogy, which scientists, teachers, and methodologists distinguish from the interdisciplinary field of knowledge and scientific discipline at the intersection of museology, pedagogy, and psychology, to the scheme of analysis of educational activities in the museum, often leads to an incorrect understanding of the very content of the educational activities of museums, in which they begin to include ordinary games, quizzes, competitions in the museum that do not have clearly defined goals and results of activities, occur spontaneously, and do not take into

account the differentiated composition of participants.

The result is non-compliance with the modern requirements of the established forms and methods of educational work of the museum with visitors, which often reflect only certain parts of the wide palette of modern understanding of the ways of organizing learning in the museum environment, because education is a complex, open, non-linear social system, a social institution, and an area of spiritual production (Krysovatyi, 2015, p. 118).

The decisive element that reconciles the contradictions between education and the museum can be scientific education and scientific knowledge, which, in our opinion, qualitatively complement the different interpretations of museum pedagogy:

- In conjunction with the concepts of 'cultural and educational activities of museums', 'museum education', 'pedagogy of museum activities', etc.
- As a meaningful activity in the museum environment, which in different historical eras depended on the dominant educational paradigm, the model of the museum, and the types of visitors.
- As a modern educational and training technology, which makes it possible to implement research and project work in the museum, thus contributing to the introduction of innovative activities.

For example, the latter provision is an important element of museum educational models that implement the project method and include teacher training, classroom work using museum resources, visiting the museum, applying this method as a basis for teaching and learning with integration of various activities.

In particular, it is based on a deep and ongoing collaboration between the school teacher and the museum educator, as teachers contribute to formal education and combine non-formal education into a collaborative workflow in which the two institutions learn from each other in the interest of scientific education. In this context, it is necessary to significantly strengthen the role and importance of museums as tools for teaching and learning through long-term educational activities.

Therefore, the museum institution is increasingly perceived as an expert that promotes methodology and attracts pupils with knowledge, rather than imposes one-sided meanings. This new role is in line with the direction in which science museums and research centres are currently operating, from scientific literacy and public understanding of science to shaping personal meaning and public engagement in science and research (Xanthoudaki et al., 2007, p. 7).

The project work is actively implemented in modern centres of science and technology, which enable young people to better navigate in various technical mechanisms, understand the principles of their work, and be aware of the prospects for new scientific inventions. This is extremely relevant, because, for instance, in the United States, about 70% of jobs today require specialized knowledge and skills (compared to 5% at the beginning of the last century) (Koshmanova, 2013, p. 347).

The purpose of the article is to analyse the content and orientation of the educational activities of museums in the context of dissemination of modern scientific knowledge and ideas of scientific education.

Understanding and awareness of various theoretical and applied aspects of this activity in the museum environment leads us to a deeper analysis of the 'scientific education' term.

Methodology

Museums can successfully implement in their practice various everyday opportunities for the promotion of knowledge and motivation of pupils and students to study and scientific activity. To do this, they create special educational museum programmes that correspond to the principles of cognitive, behavioural, and emotional development of a young person, contribute to increasing the effectiveness of their knowledge, and motivate them to study more.

To find out the effectiveness and possibilities of introducing educational programmes into museum practice, we conducted a study among teachers of national secondary schools, teachers of higher education institutions, and museum workers on the effectiveness of these programmes for working with pupil and student youth. In particular, the peculiarities of operation of educational and museum institutions during the COVID-19 pandemic were taken into account.

The study was conducted in the form of an online survey and covered a questionnaire of 10 questions on the organization, drafting and implementation of museum educational (museum pedagogical) programmes in the practice of communication with pupils and students in the museum environment with the opportunity to express their own attitude to the suggested issues. The total number of respondents was 42 people.

Results and Discussion

The results of the survey make it possible to establish that the absolute majority of respondents (92%) support the idea of expanding the boundaries of cultural and educational (pedagogical and educational) activities of the museum. Approximately the same number (93%) support the idea of creating museum and pedagogical programmes to expand communication in the museum.

The respondents primarily indicated interactivity (88%), the development of creative thinking (85%), and cognitive character (83%) as the basis on which museum pedagogical programmes should be based.

This is not surprising, because any museum programme in its essence can significantly change interest in a particular museum institution, contribute to its promotion at the regional and national levels.

Describing the importance of the interdisciplinary content and nature of museum pedagogical programmes, the respondents pointed to the importance of covering various fields of knowledge in the context of a particular museum and the ideas of scientific education, and therefore, various school subjects, for example, History, Art, Literature, Artistic Culture, as well as Physics, Chemistry, Computer Science, Mathematics, etc.

While responding to the question of the components of museum pedagogical programmes, the respondents unanimously emphasized all three basic components of the programmes: organizational, methodological, and technological, the structural unity of which makes the programme integral and complete. They made similar statements regarding the importance of taking into account the age and individual characteristics of visitors, which is facilitated by the differentiation of the orientation of programmes (77%), visualization of content (81%), availability of tasks (85%), optimally directed course of each lesson (85%), and the use of museum pedagogy means (87%).

Assessing the effectiveness of museum pedagogical programmes, the majority of respondents agreed that for each structural element of an educational institution (class, group), they should take place at least once a month (64%), and the total number of classes should be in the range from 3 to 7 (57%). First of all, such classes should be interactive (95%), characterized by maximum interest of the audience (87%), organization of project activities (63%), popularization of scientific education ideas (61%), etc.

According to the respondents, programmes focused on the traditions of tangible and intangible cultural memory (88%), gaming technologies (82%), the formation of cognitive interest in various activities (79%), etc. may have the greatest popularity in the museum institution among the pupil and student audience.

Stressing the importance of drafting museum pedagogical programmes as factors in the integration of education, culture, and scientific knowledge in the museum environment, all respondents almost unanimously (98%) supported the idea that these programmes should be implemented by museum workers (teachers) in cooperation with school teachers, methodologists, and higher education establishment teachers.

The results of the survey confirm the significant interest in the introduction of educational (museum pedagogical) programmes in the environment of national museums among teachers of national secondary schools, teachers of higher education institutions, and museum workers with minor visiting reservations. It can be assumed that this is due to quarantine restrictions during the COVID-19 pandemic.

The interviews that helped to collect detailed information about the results and to interpret them were based on the own methods of prof. Oleksii Karamanov (Ivan Franko National University of Lviv) and were based on his own museum practices for pupils and students conducted before the COVID-19 pandemic, which covered a wide range of museum communication methods (‘hero evaluation’, synchronicity, multi-level survey, etc.), as well as a system for evaluating museum programmes based on clarifying, interpretive, practical, analytical, creative and evaluative questions. They allowed us to identify the advantages of

developing and implementing museum and pedagogical programmes in the practice of interaction with secondary schools and higher education institutions in terms of their rationality, clarity, validity and achievability of learning objectives, interdisciplinary nature, and consideration of age-specific features.

In this context, the idea of the need for large-scale introduction of such programmes in museums, centres of science and technology, science parks, which is important for the dissemination of modern scientific knowledge, seems relevant.

The results of the implementation of museum pedagogical programmes are significant for researchers and practitioners who seek to identify the principles and methods of projecting museum education that best contribute to the development of knowledge and motivation in science (Martin et al., 2016).

Decisive in this context is the consideration of historical models of communication, learning styles in the museum, pedagogical technologies, as well as the basic vectors of orientation of educational work of museum institutions.

Museums as informal institutions are able to offer a unique and inimitable experience. They provide access to authentic objects and unique experiences to improve learning that is difficult to implement at school. That's why it is important for museums to develop educational programmes based on their own educational values – values that have to be clearly formulated and applied in their daily practice (Tran, 2007).

We believe that the scientific substantiation of any approach to understanding the content of museum pedagogical (pedagogical and educational) activities of the museum in dealing with pupil and student youth is possible provided that the relevant educational paradigm is taken into account.

In particular, in the context of the cognitive paradigm, we can talk about the so-called traditional nature of museum activities, when the following comes to the fore:

- The need to provide as much information about museum pieces as possible.
- Insignificant attention to the delineation and differentiation of the excursion material for different age groups.
- Accumulation of various semantic, value, and emotional evaluations by visitors after visiting a museum, which they cannot effectively implement.
- Almost complete absence of additional tasks, flash cards, special guides for different age groups.

Instead, a personally oriented paradigm in this sense is characterized by much wider opportunities and prospects for application, due to:

- Greater openness and 'transparency' of museum pedagogical classes.
- Focus on the creation of a museum learning environment with appropriate attributes.
- Aspirations not to memorize information, but to the comprehensive development of the child.
- Creation of opportunities for active cooperation at the exposition by taking into account its thematic subject areas.

At the same time, the creative paradigm, focused on the maximum development of the individuality and creativity of the child, provides for:

- Greater attention to the manifestation of creative abilities in the museum environment by combining various activities, subject areas, and methods of communication.
- Appropriate organization of an emotionally rich comfortable museum learning environment with an emphasis on interpersonal communication.
- Active involvement of creative project work in the museum, taking into account the age of each child.
- Development of creativity, multifaceted thinking in the process of museum classes, together with moral responsibility for own actions.

What does the above mean for the child's development? Along with the obvious development of competencies, abilities, and motivation to study, one should not forget about the powerful moral educational effect of the educational activities of museums, because moral education:

- Contributes to the expansion of the child's knowledge of a variety of social norms and rules.
- Develops a positive attitude of the educate to basic social values.

- Encourages gaining the experience of social action, which is attractive due to its value orientation (Sysoieva, 2017, pp. 27–28).

In this sense, the museum environment is a perfect place for the implementation of numerous educational methods and strategies. In particular, when it comes to the dissemination of modern scientific knowledge in the process of organizing educational activities in museums which are centres of science and technology, we can notice the obvious effectiveness of moral education, because it is done:

- (where?) Only in the communities that the child creates together with adults who are important to the child.
- (in the process of what?) Only in the interaction and joint actions of children and adults.
- (in what way?) As the child's internationalization of the picture of the adult world, joint actions with which the child experiences.
- (what for?) For helping the child master higher, socially useful types of human activity (Sysoieva, 2017, p. 28).

Conclusions

Based on our own research, we can state that the interpretation of museum pedagogy in the context of disseminating modern scientific knowledge and the analysis of relevant educational paradigms can be understood as:

- An important *practical component of museum communication*, which makes it possible to organize and build new relationships in the system of interaction of visitors with the materials of the exhibition in the museum and museum-surrounding environment.
- A *modern educational and pedagogical technology* that provides a strategy and tactics for effective communication with visitors of all ages, determines the optimal innovative learning strategies.
- An *important component of the new educational system* – a combination of accessible educational environment and modern information and communication tools, which is characterized by creative design, lack of barriers, and multifunctionality.
- A powerful *factor of retreat from conventional and programmed knowledge*, which blocks creative thinking, inhibits cognitive processes of personality development, and lead to the formation of consumer ideology.
- A *means of forming own system of values*, beliefs, and attitudes, which contributes to the person's understanding of his/her own activities, lifestyle, and behaviour (Karamanov, 2019, p. 50).

At the same time, it should be remembered that in order to be a successful teacher, you have to turn science into entertainment, which will enable you to bring it as close to children as possible, so that they do not have a sense of power over what they study and, accordingly, their motivation will increase (Wagner, 2012, p. 124).

The best way to do this is to realistically assess the attributes and characteristics of a 21st-century pupil who is willing to create, experiment, and innovate without fear of failure, and who is able to demonstrate a willingness to collaborate and work as a team (Wagner, 2012, p. 13).

Researchers studying various challenges of modern education emphasize the significance of a number of the most important competencies of graduates of educational institutions, which include:

- Critical thinking and problem solving.
- Network cooperation, the ability to communicate with others.
- Agility and ability to adapt.
- Proactivity and initiative.
- Oral and written communication.
- Assessment and analysis of information.
- Curiosity and imagination (Koshmanova, 2013, pp. 350–352).

Without resorting to a too detailed analysis of the above, it is safe to say that almost all of these competencies can be developed and improved even from childhood in the process of organizing a properly designed educational activity in the museum. The key to success here can be scientific museums, centres of science and technology that develop scientific education – the basis of scientific knowledge, which is the driver of progressive changes in all fields of knowledge and ways of life of modern man.

The results of the study and the analysis of scientific literature allow us to recognise the importance of science education as a promising museum and pedagogical technology that is actively developing in the modern 'knowledge society' and serves as an example of combining

the theory and practice of various fields of knowledge.

Bibliographic references

Hotsulyak, Yu. V., & Halchenko, M. S. (2016). cientific education in Ukraine: Theoretical and regulatory context. Education and Development of Gifted Personality, 4(47), 5-11. http://otr.iod.gov.ua/images/pdf/2016/4/03.pdf (in Ukrainian).

Karamanov, O. (2019). Museum pedagogy in the system of the modern educational paradigm and dissemination of scientific knowledge. Museum pedagogy in scientific education: Collection of theses of reports of the participants of the 1st All-Ukrainian Scientific and Practical Conference (pp. 48–50). Kyiv: Avtorytet. https://acortar.link/kIb0iS (in Ukrainian).

Koshmanova, T. (2013). Race to the top of teacher educational excellence: New challenges and solutions. In M. Yevtukh, D. Hertsyuk, & K. Shmydt (Eds.), Pedagogical education and science in the conditions of a classical university: traditions, problems, prospects: Vol. 1 (pp. 346-356). Lviv (in Ukrainian).

Krysovatyi, A. (2015). The basic paradigm of education and their intrinsic characteristics. Psychology and society, 1, 114-121. http://pis.wunu.edu.ua/index.php/uapis/article/view/746 (in Ukrainian).

Martin, A. J., Durksen, T. L., Williamson, D., Kiss, J., & Ginns, P. (2016). The role of a museum-based science education program in promoting content knowledge and science motivation. Journal of Research in Science Teaching, 53(9), 1364-1384. https://doi.org/10.1002/tea.21332

Polikhun, N. I., Slipukhina, I. A., & Chernetskyi, I. S. (2018). Scientific education as an innovation in the education system of Ukraine. Academic Notes. Series: Pedagogical Sciences, 168, 186-189. http://surl.li/eothp (in Ukrainian).

Sysoieva, S. (2017). Interdisciplinary research in the context of the development of educology. Education, 6, 26-30. https://doi.org/10.28925/2226-3012.2017.6.2630 (in Ukrainian).

Tran, L. U. (2007). Teaching science in museums: The pedagogy and goals of museum educators. Science Education, 91(2), 278-297. https://doi.org/10.1002/sce.20193

Wagner, T. (2012). Creating innovators: How to educate young people who will change the world. N.Y.: Scribner.

Xanthoudaki, M., Tirelli, B., Cerutti, P., & Calcagnini, S. (2007). Museums for science education: Can we make the difference? The case of the EST project. Journal of Science Communication, 6(2), 1-10. https://doi.org/10.22323/2.06020202