



# VISUALIZATION OF INFORMATION IN POSTGRADUATE EDUCATION OF PEDAGOGICAL AND SCIENTIFIC-PEDAGOGICAL WORKERS

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## Abstract.

*Relevance:* The research is driven by the needs for activating and motivating postgraduate pedagogical education seekers in their studies, developing their key and professional competencies, structuring large volumes of educational material, and ensuring the individualization of the educational process.

*Objective:* To substantiate the essence, principles, and key aspects of educational content visualization in postgraduate education for pedagogical and scientific-pedagogical workers.

*Methods:* Theoretical analysis of scientific sources, Internet resources, and the experience of postgraduate pedagogical education institutions – to determine and substantiate the essence, principles, and key aspects of educational content visualization in postgraduate education for pedagogical and scientific-pedagogical workers.

*Results:* Based on the theoretical analysis of sources, the essence of educational content visualization in postgraduate education for pedagogical and scientific-pedagogical workers is defined; it is substantiated that modern professional and higher education teachers must respond to challenges related to the visualization of educational content in accordance with the cognitive processes of education seekers. The tasks facing postgraduate pedagogical education teachers include preparing pedagogical and scientific-pedagogical workers for implementing a visual-digital approach in the educational process and simultaneously ensuring effective visualization of their training in professional development courses; the principles of educational content visualization are characterized; it is revealed that the use of a virtual interactive board is useful for organizing joint activities in creating and editing documents and images and communicating in real-time; the possibilities of YouTube and TikTok platforms for preparing and applying educational video content are analyzed; the educational program of the topic "Using modern electronic demonstration equipment in the educational process" is examined.

*Conclusions:* The essence of the concept "visualization" is presented as a process and result of perceiving the surrounding reality, representing static and dynamic ways of presenting visual information, which can be characterized by a combination of images with texts, sounds, numbers, or other signs; the principles of preparing visual materials are defined (optimal volume, audience interest correspondence, perceptibility, aesthetic appearance, dynamism, diversity of forms); key aspects of visualization in the modern educational process of postgraduate pedagogical education are identified: psychological (considering the peculiarities of cognitive processes of education seekers), content-related (application of modern means of visualizing the educational process), and technological (use of electronic resources and demonstration equipment); the relevance of social media in creating visual educational content for teacher professional development is proven (activating and motivating participants, better organizing the learning process, providing additional possibilities for storing and exchanging information).

**Keywords:** *information visualization, pedagogical and scientific-pedagogical workers, postgraduate education, digitization of educational content.*

**Introduction.** In contemporary conditions of full-scale war in Ukraine, the intensive development of

distance education continues, which actualizes the issue of its scientific-methodological support at various

educational levels. Visualization and interactivity are integral components of the distance educational process, including the process of professional development of teaching and scientific-pedagogical staff. Clarifying information promotes the activation and motivation of education seekers to learn, allows structuring significant volumes of educational material, developing key and professional competencies of listeners, and individualizing the educational process. Simultaneously, the instructional-methodological aspects of visualization become a component of the content of postgraduate education for educators at all levels.

**Sources.** The principles of visualization as the basis of didactic design are substantiated by N. Zhytienova, the peculiarities of the virtual classroom's functioning in the format of general secondary education are determined by S. Lytvynova, the methodological aspects of developing and applying electronic educational resources for professional education are highlighted by R. Gurevich A., Hurzhii, V. Kovalchuk, the importance of activating the imagery sphere in preparing youth for entrepreneurial activity is defined by I. Hrytsenok, L. Yershova (2022), the peculiarities of applying the visual-digital approach in the training of labor education teachers are revealed by V. Steshenko, M. Demchenko, S. Chernyshov, the psychological-pedagogical foundations of designing multimedia content of electronic educational resources for higher education institutions are justified by S. Denysenko, the role of software tools in visualizing educational information for postgraduate pedagogical education is characterized by L. Lyakhotska.

Meanwhile, the issues of scientific-methodological support for the visualization of the educational process in postgraduate pedagogical education institutions remain relevant in the context of distance learning.

**The purpose of the article:** to substantiate the essence, principles, and key aspects of visualizing educational content in postgraduate education of teaching and scientific-pedagogical staff.

**Methods:** theoretical analysis of scientific sources, internet resources, the experience of postgraduate pedagogical education institutions – to determine and substantiate the essence, principles, and key aspects of visualizing educational content in postgraduate education of teaching and scientific-pedagogical staff.

**Results and discussion.** The contemporary understanding of information visualization as an interactive visual representation of abstract data to improve human cognitive processes is actualized today in the context of its interaction with the computer, the

development of computer sciences, graphic design, psychology, business methods, and distance education. O. Babych and O. Semenikhina (2014) note that the concepts of "visual clarity" and "visualization" cannot be equated in the modern interpretations of these terms. On one hand, visual clarity is distinguished among types of clarity, so the visualization of educational material can be considered a type relative to the generic concept of "clarity." On the other hand, if the term "clarity" correlates with an already formed image of the educational object, then the term "visualization" is interpreted as the process of creating a visual image, which suggests that the concept of visualization of educational material is broader. Thus, visualization is both a process and a result of perceiving the surrounding reality, represents all available ways of presenting visual information, both static and dynamic, can be characterized by a combination of images with texts, sounds, numbers, or other signs.

For better perception of information through the screen during the preparation of visual materials, certain principles should be followed, including: optimal volume, audience interest, accessibility for perception, aesthetic quality, dynamism, and variety in forms.

According to V. Steshenko, M. Demchenko, S. Chernyshov (2020, p.138), the effectiveness of contemporary youth education is conditioned by the application of the visual-digital approach as a result of integrating two approaches: visual, involving the active use of visual aids to support any types of educational activities, and digital, implying the involvement of digital technologies and services to activate cognitive activities. The authors emphasize such a psychological feature of the young generation that grew up in the digital era as clip thinking.

Such thinking is an inevitable consequence of the development of modern society and has both pros (accelerated reaction, brain protection from information overload, development of multitasking) and cons (low attention concentration and reduced capacity for deep logical analysis, weakening of empathy, deterioration of academic performance and knowledge assimilation coefficient) (Korolchuk, 2019). Clip thinking is considered a logical consequence of the development of modern society, having both advantages and disadvantages. Protecting the psyche of modern humans from overload, it impedes the ability to concentrate and analyze information. In this context, the development of critical thinking in education seekers using visualization tools, which ensure simplicity, accessibility, and high data reading speed by the audience, becomes particularly relevant. Preparation of pedagogical and scientific-pedagogical workers for the implementation of the

visual-information approach includes mastering modern services for preparing presentations, searching for images, creating visual collections, using contemporary electronic demonstration equipment. Thus, modern educators in professional and higher education must respond to challenges related to the visualization of educational content according to the cognitive processes of education seekers, and postgraduate pedagogical educators face the task of preparing pedagogical and scientific-pedagogical workers for the implementation of the visual-digital approach in the educational process and simultaneously ensuring effective visualization of their training in professional development courses. Therefore, we determine the psychological aspect of visualization, which should be based on considering the common and different in the cognitive processes of youth and adults. Today, the high efficiency of visualizing educational material in adult education is beyond doubt. The majority of postgraduate education seekers better absorb new information if it is presented vividly and interactively, making visualization an integral part of the modern professional development process. Instructors of postgraduate pedagogical education institutions seek answers to questions regarding maintaining audience attention in distance learning conditions, using modern online services to create visual aids, methodological support for visualization, and searching for new ideas for its implementation. We characterize the possibilities of visualizing the educational process in the context of professional development of educators in terms of content. Among modern visualization tools are static schemes, diagrams, dynamic models, interactive presentations, online boards, gamification tools, causal chains, clusters, mind maps, infographics, videos, etc. A. Tyutyunnik (2020) notes that visualization is often associated only with linear charts and tables, while it is a broad concept, a system for conveying data, complex ideas, and patterns through visual images. The author states that data is often visualized to satisfy the fundamental need to tell a user story. In this context, we emphasize such a modern trend as storytelling, where facts are not presented "dryly" but through a live story of a specific person, which will determine the choice of visualization type and forms (Nyshporska, 2020). From the perspective of organizing collaborative work on creating and editing images, documents, and real-time communication, we characterize such a networked social resource as a virtual interactive board (electronic board, wall, online board, whiteboard project). It is an effective tool for learning, allowing the combination of text, images, video, and audio materials on a single platform. Online boards emerged in 2006–2007 and remain popular among educators. Currently, the Internet presents

a significant number of virtual interactive board web resources, which, depending on the characteristics of use in the educational process, are conditionally divided into 4 groups: for creating interactive posters, newspapers; for drawing; for storing notes; for organizing collaborative work with various content. Here is an example of an author's online board for the topic "Creating Educational Web Quests" (<https://padlet.com/romanovleonidantolyevich/t0q7f47eiyk2>). The analysis results of open classes by teachers of the Central Institute of Postgraduate Education of DZVO "University of Education Management," implementing the professional development educational process in the field of "Education / Pedagogy" under quarantine restrictions and martial law, indicate the mandatory use of multimedia presentations and the popularity of videos. It is noted that YouTube, as a unique video hosting service, is useful for preparing and using video content, allowing users to view thematic videos. YouTube, hosting millions of videos, would require 1000 years to watch all videos uploaded to it, according to analysts. As a free platform for conducting online classes and self-education, YouTube becomes an essential, reliable, and indispensable assistant for educators, particularly allowing the finding, viewing, and storing of audio and video files, creating presentations, playlists, thematic video collections (NaUrok, 2019).

Let's highlight the advantages of this platform for learning. First and foremost, it activates learners in the classroom. Properly chosen videos enhance the perception of educational material. For example, watching fragments of innovative lessons is much more interesting than listening to their description. Secondly, it involves providing interesting tasks for independent work, which entails students independently searching for relevant videos, analyzing them, and selecting for their own presentations, as well as using playlists where they can find necessary educational-methodical materials. Thirdly, recording lessons and preserving them for later viewing is effective. Such recordings are appropriately uploaded to a personal YouTube channel and links are provided to students, allowing them to independently return to interesting and important aspects of the topic. Such videos are also beneficial for the teacher for future use. YouTube also offers opportunities for using unconventional forms and methods of teaching. For instance, teachers can propose cyber hunts to students: give a link to a specific educational video, and after viewing, conduct a test, with successful completion giving them access to the next task, with winners determined based on the results of all tasks (symbolically, the reward could be links to useful resources). Another powerful advantage of using

YouTube is motivation for learning. Since video in the educational process is multifunctional, it can be used to activate attention, relaxation, gain new knowledge, organize thematic discussions, implement the aforementioned storytelling, create a positive atmosphere, uplifting. Thus, thanks to YouTube, teachers can make lessons interactive, more modern, and original.

In preparing video content, it's also prudent to consider that TikTok, a youth platform, is currently the most downloaded application worldwide, predominantly used by individuals aged 10 to 29 years. Unlike other social networks, the main content on TikTok comprises short thematic videos. Creating quality content doesn't require special skills – editing, cropping, slowing down, speeding up, adding effects, and music can all be done directly in the app. Popular on TikTok are dance flash mobs, as well as challenges where users post videos with similar themes, for instance, sharing life hacks, showcasing their skills, talking about books they are reading, etc. Each user's feed, unlike other social networks, is formed automatically. TikTok, using special algorithms, tracks which videos each user likes, and adjusts recommendations accordingly, which takes some time to set up. Only popular entertainment videos are shown to new users in the recommended section.

The format of short videos can be optimal not only for entertainment but also for educational content. The "Vseosvita" platform offers useful recommendations for configuring the network to automatically display only useful and interesting content (2021).

Regarding key aspects of visualization, we also include the technological aspect. Firstly, note that resources like Unsplash, StockSnap.io, Pexels, Freerange Stock, New York Public Library, Fote for free photo searches; Microsoft PowerPoint, Canva, Prezi, Google Slides for presentation preparation; link shortening services like Cuttly, HyperHost, Is.gd; and QR code creation services like websiteplanet, mobizon, qr-code-monkey, qr-coder, qr-code-generator can be helpful in preparing visual materials. Mastery of multimedia teaching tools enables the presentation of information about phenomena, processes, and objects of the material world more fully and accurately; enhances the clarity of educational material, making it more accessible to learners; intensifies the educational process through

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computer-assisted teaching and assessment; increases student motivation, activates their cognitive activity, stimulates independent work on mastering educational material; and facilitates the application of modern pedagogical technologies.

To acquaint listeners with modern electronic demonstration equipment and its application possibilities in the educational process, we have developed and implemented a training program on the topic "Use of Modern Electronic Demonstration Equipment in the Educational Process" (Romanov, 2020, pp. 257-259). The practical lesson considers types of modern electronic demonstration equipment (electronic educational-methodical complex, interactive board, document camera), its application features, and develops relevant skills. It includes studying the possibilities of using a multimedia table, interactive floor, contactless sensor game controller.

**Conclusions.** The essence of the concept "visualization" is presented as a process and result of perceiving the surrounding reality, representing static and dynamic methods of visual information representation. It can be characterized by a combination of images with texts, sounds, numbers, or other signs. The principles of preparing visual materials are defined: optimal volume, correspondence to the audience's interests, accessibility for perception, aesthetics, dynamism, and variety of forms. The key aspects of visualization in the contemporary process of enhancing the qualifications of pedagogical and scientific-pedagogical workers are characterized: psychological (consideration of the peculiarities of cognitive processes of education seekers), content-related (application of modern means of visualizing the educational process), and technological (use of electronic resources and demonstration equipment). The relevance of social media for creating visual educational content for teacher qualification improvement is proven (they activate and motivate listeners, help to better organize the learning process, and provide additional opportunities for storing and exchanging information).

**Further research plans** to investigate the application of visualization technologies in mobile learning in open postgraduate education.

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## ВІЗУАЛІЗАЦІЯ ІНФОРМАЦІЇ У ПІСЛЯДИПЛОМНІЙ ОСВІТІ ПЕДАГОГІЧНИХ І НАУКОВО-ПЕДАГОГІЧНИХ ПРАЦІВНИКІВ

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### Реферат:

*Актуальність:* дослідження зумовлене потребами в активізації й мотивації здобувачів післядипломної педагогічної освіти до навчання, розвитку їх ключових і фахових компетентностей, структуруванні значних обсягів навчального матеріалу, забезпеченні індивідуалізації освітнього процесу.

*Мета:* обґрунтувати суть, принципи та ключові аспекти візуалізації освітнього контенту у післядипломній освіті педагогічних та науково-педагогічних працівників.

*Методи:* теоретичний аналіз наукових джерел, інтернет-ресурсів, досвіду діяльності закладів післядипломної педагогічної освіти – для визначення та обґрунтування суті, принципів і ключових аспектів візуалізації освітнього контенту у післядипломній освіті педагогічних та науково-педагогічних працівників.

*Результати:* на основі теоретичного аналізу джерел визначено суть візуалізації освітнього контенту у післядипломній освіті педагогічних та науково-педагогічних працівників; обґрунтовано, що сучасні викладачі професійної і вищої школи мають відповідати на виклики, пов'язані з візуалізацією змісту навчання відповідно до особливостей когнітивних процесів здобувачів освіти, а перед викладачами післядипломної педагогічної освіти постають завдання підготовки педагогічних і науково-педагогічних працівників до реалізації візуально-цифрового підходу в освітньому процесі та водночас забезпечення ефективної візуалізації їхнього навчання на курсах підвищення кваліфікації; охарактеризовано принципи візуалізації освітнього контенту; з'ясовано, що для організації спільної діяльності зі створення й редагування документів і зображень та спілкування в реальному часі корисним є застосування віртуальної інтерактивної дошки; проаналізовано можливості платформ YouTube і TikTok для підготовки і застосування навчального відеоконтенту; проаналізовано навчальну програму теми «Використання сучасного електронного демонстраційного обладнання в освітньому процесі».

*Висновки:* суть поняття “візуалізація” представлено як процес і результат сприйняття навколишньої дійсності, що репрезентує статичні і динамічні способи представлення зорової інформації, може характеризуватися поєднанням зображень із текстами, звуками, цифрами або іншими знаками; визначено принципи підготовки візуальних матеріалів (оптимальність обсягу, відповідність інтересам аудиторії, доступність для сприйняття, естетичні вигляду, динамічність, різноманітність форм); визначено ключові аспекти візуалізації сучасного освітнього процесу післядипломної педагогічної освіти: психологічний (врахування особливостей когнітивних процесів здобувачів освіти), змістовий (застосування сучасних засобів візуалізації освітнього процесу) і технологічний (використання електронних ресурсів і демонстраційного обладнання); доведено актуальність соціальних медіа для створення візуального навчального контенту з

підвищення кваліфікації педагогів (активізують та мотивують слухачів, допомагають краще організувати процес навчання, надають додаткові можливості із зберігання та обміну інформацією).

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**Ключові слова:** візуалізація інформації, педагогічні і науково-педагогічні працівники, післядипломна освіта, цифровізація освітнього контенту.

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