Information Technologies In Teaching: The Basis Of Students' Knowledge

Nataliia Morska[†], Olena Fedorenko[††], Olha Davydova[†††], Vitaly Andreev[††††], Galina Bohatyryova[†††††], Nataliia Shcherbakova[††††††]

[†] Department of Philosophy and Social Sciences, Ternopil Volodymyr Hnatiuk National Pedagogical University, Ternopil, Ukraine,
[††] Department of Pedagogy and Psychology, Kharkiv National University of Internal Affairs, Kharkiv, Ukraine
[†††] Research Laboratory of Psychological Support, State Institute of the Ministry of Internal Affairs of Ukraine, Kyiv, Ukraine
[††††] Department of Innovative Technologies in Pedagogy, Psychology and Social Robotics, Alfred Nobel University, Dnipro, Ukraine
[†††††] Department of Tourism and Regional Studies, Mikhailo Tuhan-Baranovskyi Donetsk National University of Economics and Trade, Kryvyi Rih, Ukraine
[††††††] Department of Civil Law and Civil Procedural Law, Donetsk National University named after Vasyl Stus, Vinnytsia, Ukraine

Summary

The paper proposes to consider information technologies and their application in the educational process as a preparation of presentation material for students of higher educational institutions.
The definition and place of information technologies in the educational space are considered. The object of research of this work is the pedagogical technology of presentation of educational information, which substantiates the pedagogical technology of visualization of educational information in higher education, as well as determine its composition and structure. The practical side of pedagogical technology of educational information presentation is considered.

Keywords: *Information Technologies, Science Preparation, Higher Education Institution Training, Principle of Clarity, Discipline, Pedagogy.*

1. INTRODUCTION

In the world it is accepted to consider as technological approach introduction in pedagogics of system thinking, this fact assumes step-by-step management of educational process and obligatory achievement of the educational purposes. Translated from the Greek "technology" means learning about the excellence of teaching. The glossary of terms for pedagogical technologies states that initially the term pedagogical technology meant the use of information and communication tools.

Pedagogical technology is close in meaning to the term media education (study of the laws of mass communication of the press, television, cinema, video). In turn, media education is a theory of critical thinking, which allows you to perceive and analyze media texts, as well as master the basic means of media.
The basic idea of media education is more closely related to mastering the media. The visualization of educational information is procedural in nature and involves the transfer of organized educational information, based on the general laws of knowledge.

Known scientific sources can find different interpretations of the term "pedagogical technology". Pedagogical technology is a multidimensional concept, a system of functioning of all components of the pedagogical process, built on a scientific basis, programmed in time and space.
Pedagogical technology is often associated with the development of a new type of teaching aids, as well as the best ways to achieve the goal under certain conditions. In turn, the scientific component of pedagogical technology of visualization of educational information in higher education should reveal and justify how and how, using the achievements of modern science and educational practice, given the specifics of the future field of activity, to carry out the visualization process to achieve the desired result.

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2. MAIN TEXT

Visualization of educational information is necessary to describe it, which will predict the behavior in a certain range of conditions. The listed definition is intended to display a certain group of properties. It is also necessary to reveal the systemic nature of the visualization of educational information in higher education and to specify the main components of this system. Thus, we highlight the principles on which this study is based. "Principles of learning", as a rule, establishes the basic provisions that determine the content, organizational forms and methods of the educational process in accordance with its general objectives and patterns. The concept of the category "principles of learning" and is a methodically tested knowledge of laws and patterns, which allows you to use them as regulations and give in the categories of activities, including knowledge of the goals, essence.

Also, the principle of clarity underlies the educational process using pedagogical technology of visualization of educational information. The main condition is to define the concept of the principle of visibility as significant for this study. The principle of clarity in modern realities is associated with the active use of informational educational resources and involves the implementation of purposeful, systematic reflection.

At the same time, various types of visualization are combined in visual educational information and there is adequate provision of it with symbolic information, audio information, and others. Thus, allowing for a versatile presentation of educational information, realized on the basis of comparison, isolation, analysis, inductive and deductive methods of processing educational information and presenting it on the basis of visual-figurative and logical-symbolic models. In addition, the use of educational information resources to display visual information leaves a certain imprint on the correspondence of the information presented to the ergonomic, aesthetic and cultural preferences of the subject of education. The principle of visibility should be supplemented in higher education with the principles of fundamentalization and professionalization. The substantiation of the importance of the principle of fundamentalization for higher education is the orientation of modern society towards possession of universal generalized knowledge, towards the formation of a general scientific culture, and fundamental methods of information processing.

The implementation of this principle in the educational process of higher education, according to its modern understanding, presupposes the development of thinking on the basis of mastering the fundamental system of knowledge, as the basis for the mobility and competitiveness of the future employee [23-33, etc.].
The system of higher education requires the provision of not only the fundamental, but also the applied orientation of educational information - this is the origin of the principle of professionalization [23, 24, etc.].

The implementation of this principle includes the professional orientation of educational information, which, when revealing the essence of scientific laws, technical provisions, relies on their application in the chosen field of activity; consideration of the problem situation, development of solutions to practical problems in the context of the chosen field of activity; selection of optimal modes of work processes, use and maintenance of production and technical documentation, diagnostic equipment and equipment, monitoring the progress and results of technological processes, and more.

Various aspects of educational information, considered from the standpoint of a systems approach, are widely developed by modern researchers. At the same time, within the framework of this study, it is necessary to clarify the author's position in the context of visualization of educational information in higher education.

The educational process of higher education is a purposeful activity for teaching, upbringing and personal development through organized educational and professional activities that, in unity with self-education, ensure the assimilation of educational information. The pedagogical technology of visualization of educational information is accompanied by the emergence of new ways of displaying scientific-fundamental and applied visual information and leads to the search for ways to further improve the work with visual information, which got its origins in the traditional principle of visibility in pedagogy.

In addition, it should be noted that the visualization of educational information is considered by us, on the one hand, as a subsystem of the learning process, and on the other, as a supersystem of individual visualization tools. Subsystems that include separate visualization tools can be considered as elements with unambiguous properties (for example, individual images, schematic structures, video information blocks, etc.) can act as the final elements of educational information.

In this case, the educational process as a system of a higher order can be considered as a part of the external environment interacting with the system of visualization of educational information.

As mentioned above, the educational process is a purposeful activity, therefore, we will begin to consider

the “educational process” system by specifying the learning objectives. Learning objectives are backbone for the considered dynamic system "educational process". The most important for the study of the visualization of educational information in higher education, considered from the standpoint of a systems approach, is the provision that the goal of the system does not consist only of the totality of goals of its elements [1-6]. Accordingly, in the context of the visualization of educational information, it is not enough to separately consider the general educational (fundamental) and professionally oriented (applied) goals of visualization, they must find their place in the overall goal of training a student, carried out based on the pedagogical technology of visualizing educational information in higher education.

Some of its most preferable state can be considered as the goal of the system under study [9], for the achievement of which it is necessary to solve the problem of bringing the system to the designated state for given resources. In our case, it is necessary to determine the goals of visualization of educational information in the educational process of higher education and ways to achieve them based on the selected resources and their scientific substantiation.

The active use of information resources in many areas of activity leads to the need to form the experience of student information activities in the chosen direction. To ensure this in the educational process of higher education, it is necessary to carry out the formation of experience not only with fundamental scientific, but also with applied visual educational information.

Modern information educational resources and educational and methodological complexes reflect the content of education. Let us consider what is understood in the pedagogical literature by the content of education. Social experience is the source of educational content. The cultural concept of M.N. Skatkina, I. Ya. Lerner, V.V. Kraevsky considers as the content of education the pedagogically adapted social experience of mankind, identical in structure to human culture and consisting of:

1. Knowledge without which purposeful action is impossible (about the world, nature, society, man, technology and methods of activity, etc.).
2. Experience in various ways of activities to ensure the reproductive development of society.
3. The experience of creative activity to ensure the further development of culture, that is, seeing the problem in a new way, predicting different results, transferring knowledge and skills to a new field of activity, and so on, which is facilitated by problem-developing learning, which contributes to the assimilation of the method of obtaining scientific knowledge.
4. Experience of an emotional-value attitude to reality, to one's own activities, to the formation of the spiritual sphere, beliefs, ideals, values.

Considering the content of education from the standpoint of systems analysis, scientists distinguish the following levels of its formation: general theoretical understanding, academic subject, educational material, learning process, personality structure [29]. Let us consider in more detail V.V. Kraevsky, the levels of formation of the content of education, as significant for this study.

At the theoretical level, the content of education is fixed in the form of a generalized idea of the composition and structure of social experience (as discussed above) and is an order of society.

The level of the academic subject - the source of the formation of the educational content of the academic subject is science (or a certain branch of activity). At the same time, the academic subject is an “artificial construction”, since it takes into account not only the logic of science, but also the general laws of the learning process. The content of the academic subject includes elements of knowledge, reproductive, creative activity, cognitive tasks, including the foundations of the corresponding science in the form of facts, concepts, laws, theories, formulas and others.

The level of educational material - elements of the content of education included in the course on the academic subject (contained in textbooks, teaching aids, problem collections, etc.).

The first three levels represent the projected educational content. The fourth level reveals the interaction of participants in the educational process, the fifth level - the final result of training, manifested at the level of personality structure [27]. Practical examples of displaying the content of educational information specific to higher education and related to the applied nature of information adopted in certain fields of activity can be X-rays, phase diagrams of solids, geographical maps, weather forecast charts, computer tomograms, radio astronomy observations, and much more.

Let us consider the visualization of educational information within the framework of a systematic approach, it is advisable from the standpoint of system analysis [35], describing it from three points of view: functional, morphological and informational.

Let us reveal and highlight, from the standpoint of system analysis, significant provisions concerning the expediency of a functional description of the visualization of educational information within the framework of a systematic approach. We will focus on the functions of educational information in the educational process. Educational information is characterized by the functions it performs [30] in educational activities. Accordingly, the functional direction of visualization of educational information within the framework of a systematic approach is designed to determine the place and role of information in the educational process; relationship with other types of information (for example, with verbal); quantitative and qualitative characteristics (for example, how much visual information is needed, the properties that must be possessed), the required level of development and application in educational activities; dependence on the assessment system (teacher, expert, testing system, etc.), development directions (for example, 3D modeling, on-line consulting).

Let us reveal and highlight from the standpoint of systems analysis the significant provisions concerning the expediency of the morphological description of the visualization of educational information within the framework of the system approach. The morphological direction (morphology is the science of form, structure) of visualization of educational information within the framework of a systematic approach allows you to determine the structure, depth of description, level of detail, communication, construction features. For example, part-whole subordination relationships; generation relationships (cause-effect), place of application (internal-external), direction of processes (forward-reverse). Moreover, feedbacks play an important role in learning, since they regulate the development of the system.

Let us reveal and highlight from the standpoint of system analysis the significant provisions concerning the expediency of the informational description of the visualization of educational information within the framework of the systematic approach. As noted above, the general term educational information is understood as data, signals to be received, transmitted, processed, stored. The informational description of the educational information visualization system allows to determine the methods of working with visual educational information using the syntactic, semantic and pragmatic aspects of information, to ensure its activity orientation.

In addition, there are significant characteristics of educational information that affect the efficiency of its development, such as timeliness, relevance, reliability, reliability, intensity, redundancy, duplication, variability, and others. Criteria influencing the overall quality of information are also highlighted: depreciation with use, aging, inconsistency, and others.

Considering the content of education as the basis for the visualization of educational information, it is required to determine the interaction of the subsystem of visualization of educational information and the teaching aids that serve to display visual educational information of higher education. In this regard, let us clarify what in the pedagogical literature is understood by the general term teaching means.

In the pedagogical literature, various material objects [1-6, 23-33], carriers of educational information, instruments of activity of subjects of the educational process are referred to as teaching aids. It is known that a material or ideal object that is "placed" between the teacher and the student and is used to assimilate theoretical knowledge or practical experience is considered to be a means of teaching.

In the pedagogical literature, the following main functions of teaching aids are distinguished: informational (for example, sources of information); adaptive (focus on individual capabilities); compensatory (facilitating the process of cognition); managerial (management of educational activities, feedback); integrative (complex use of information from various sources); interactive (realizing direct and feedback); motivational (stimulation and activation of cognitive activity).

Depending on the functions performed, teaching aids are classified according to the following grounds [27]: ways of perceiving information (audiovisual, multimedia); ways of presenting information (technical, non-technical); the nature of the visual display (static, dynamic) and others.

Let us consider the subsystems "content of education" and "teaching aids" from the standpoint of systems analysis, which we understand from the standpoint of V.V. Kraevsky, I. Ya. Lerner S.A. Smirnov, and designed to reflect the relationship of teaching aids at the level of: 1) training session; 2) the subject; 3) the entire learning process.

Let us reveal the dependence of the choice of visualization tools on the nature of displaying objects and ways of presenting information in an environment saturated with technical training aids. At the same time, we strive to substantiate the correctness of the selection of the following set of characteristics, within the framework of which the completeness of the applied means of visualization of educational information can be ensured.

The set identified and justified below includes: real or synthesized, planar or volumetric, static or dynamic character of information display.

Let us show the validity of the analysis of the displayed information, taking into account whether it is close to the real representation of objects, or is based on a synthesized representation of abstract images. The closest to the positions of this study on the real or synthesized nature of displaying educational information is the position of S.G. Shapovalenko, who groups the teaching aids as follows:

1. Natural objects are originals.

2. Display of objects and phenomena of reality (volumetric, planar, audiovisual, etc.).

3. Description of objects and phenomena with conventional signs (teaching aids; books, reference books, methodological literature, etc.).

4. Technical training aids (information, control, simulators, etc.).

This position is to a certain extent supplemented by the opinion of L.M. Bosova [35], according to which the information of digital educational resources has the following forms of presentation:

1) symbolic information (hypertext, formulas). The text is divided into paragraphs, which are structured using subheadings, tables, lists; natural science and technical texts may contain formula information; hyperlinks provide thematic links of information. Ergonomic arrangement of information on the screen. Improving the performance of navigation and display content, tooltips, and more.

2) static realistic and synthesized visual series (photographic images, 2D panoramas, microphotography, various schemes, graphs, images, etc.). Accompanying the text with high quality images; optimal use of screen space due to: scaling, slide shows, interactive maps, time tapes, as well as the ability to decompose block diagrams, device diagrams, natural and man-made objects, and others.
Based on the described set of means, in this study it is proposed to rely in the display of educational information on the transition from natural objects, which are real elements of objective reality, to their display by audiovisual means and, finally, conventional signs, words and phrases of natural and artificial languages, as well as information models.

Let us show the validity of the analysis of the displayed information, taking into account spatio-temporal parameters, that is, whether it is expressed in planar or volumetric spatial presentation, as well as the dynamics of its presentation, or it is used as a static image.

In this context, the point of view of L.M. Bosova, who considers the following spatio-temporal multimedia components of educational content: dynamic realistic and synthesized visual series (video experiments, video tours, 3D panorama with changing points of view, animation; virtual three-dimensional models of objects, etc.) Objects and processes manifested in dynamics, dynamic video sequence; immersion in the subject is achieved through tooltips, scalability of objects (spherical photos, video panoramas, interactive three-dimensional models, etc.). In the natural sciences and engineering disciplines, it is advisable to use interactive parametric models, in which the intensity is achieved by changing the playback mode or process parameters, etc.

Based on the described set of tools, in this study it is proposed to rely in the analysis of the level of information display on clearer divisions of its spatial and temporal characteristics. For the separation of spatio-temporal characteristics, firstly, expression in planar or volumetric spatial presentation, for example, 2D animation, video experiments, video excursions, combined into virtual tours for plane objects and 3D photo panoramas with zoom in / out, ZD animation, virtual and interactive three-dimensional models of objects, etc.

In addition, it is noted that there is a relationship between a real object and its computer model in professional activity [13].

As mentioned above, for the formation of experience in working with fundamental and applied visual educational information, it is necessary to “ensure the quality of visualization of educational information”, that is, an adequate level of reflection of educational information by visual elements of the chosen field of activity is necessary. Since a student's information activity takes place in a certain environment that has specific characteristics (for example, MS Office applications, legal reference systems, educational and methodological complexes, etc.) from the position of displaying educational information by visual means, it is required to select their leading characteristics. In this presentation, we will classify the specific features of the teaching aids used on the basis of the leading tools for the profession and labor results. For this, we conditionally divide the educational environment of higher education according to the criterion of visualization of educational information [8-12]. This splitting produces two types of visual instructional information:

1. First, visual educational information that should be presented taking into account the specifics of information

activities;

2. Second, the choice of a tool for visual display of educational information in the preparation of a student in the chosen field of activity.
Let us designate and reveal the classification from the point of view of visualizing educational information.

1. Orientation to the real-abstract or synthesized nature of the displayed information elements;

2. Representation in the structure of two-dimensional or volumetric models;

3. Reproduction by static or dynamic elements of educational information.

Let's reveal and describe the indicated classification from the point of view of the used visual elements of educational information. Let's give practical examples of their application in the educational process:

1. Orientation to the real-abstract or formalized nature of the displayed elements.

a) the real-abstract nature of the display of visual elements of information (reflected in the real world) includes structures ordered in ascending order of the level of abstraction in the order of transition from real images to more and more abstract ones [25], generalized by means of visualization by highlighting the most essential elements of information and abstraction from less significant. An example would be the following chain: photography> technical drawing> diagram;

б) the synthesized nature of the visual elements of educational information (conveys properties and features hidden from direct observation) includes structures in ascending formalization of the transmitted idea, from the structural presentation of information with its subsequent graphic generalization and the allocation of a rigid structure in the form of a formula. An example is the following chain: table> graph> formula.
Let's characterize the visual elements of educational information of a real type of display: photography> technical drawing> diagram.

Photography - reflects the spatial interaction of objects, objects similar to human vision. Technical drawing - conveys the shape, basic proportions of the object, its dimensions. Scheme is a product of highlighting the most essential details of information.
Let's characterize the visual elements of information of a formalized nature: table> graph> formula. Table - a set of numerical (symbolic) data, painted by graphs, scales. A graph is an expression of quantitative dependencies of interrelated quantities. Formula is a visual display of a rule, law, function.

The question of which visual elements are preferable to use in the educational process is rather controversial [34]. So, perspective images are considered the most effective in perceiving information. Tables and graphs are mutually transformable. Practice shows that it takes up to 2.5 times more time to read a table than to read graphs, but the error when reading data from graphs is 4 times higher than from tables. The grid improves the efficiency of the charts by 30%. And the "visibility" of the formula is determined by the degree of preparation of the subject.
Techniques for using visual elements of professionally significant information in the educational process have not yet been sufficiently developed, although certain visualization methods are known in some areas of activity. For example, the periodic system of D.I. Mendeleev, a unified system of drafting (engineers), musical notation (musicians), geographical and geological maps (geographers, geologists) and others.

2) Representation in the structure of two-dimensional or volumetric models.
a) planar visual elements of educational information - structures that have a spatial-color display in the order of recognition of information elements. An example would be the following chain: color> shape> position.
b) volumetric visual elements of information - structures of ascending volumetric modeling of information in the order of transition from pseudo-volumetric objects to real volumetric objects in 3D format An example is the following chain: projection> stereo image> volumetric object.

Color is the main characteristic of an object, it helps its realistic display, makes it easier to recognize. Recognition of the shape of an object occurs by identifying its outlines, boundaries and comparison with a previously known template. Plane location of the object has certain patterns [3, 8, 9]: vertical text is read longer than horizontal; more attention is paid to the information located in the upper right corner (33%), followed by the upper left corner (28%), lower right and left, respectively 23% and 16%; vision requires the grouping of information (rule "7 ± 2").
When visualizing educational information of higher education, it is necessary to understand that vision is "trained" in the process of object recognition, that is, the experience of working with visual educational information is being formed. In certain scientific and some spheres of activity there are descriptions-templates [21], for example, in engineering, five ways of representing abstract information are used: symbols, shape, color, orientation,

silhouette.

Let's characterize the visual elements of the volumetric display of information (in the order of transition from pseudo-volumetric objects to real volumetric objects in 3D format): projection – stereo image – 3D object.

Plane projection is the most common way to create volumetric images in certain areas of activity related to mechanical engineering, architecture, design and others. Perspective is one of the ways of displaying objects in accordance with their cut-off relations, outlines, shapes.
Binocular vision is the reason for our 3D perception of the world. Stereo imaging allows each eye to deliver "its own" image, forming a pseudo-volumetric perception of the object. The creation of real volumetric images, for example, a 3D projector from Apple and others, is often announced on the Internet, but currently the only way to create a real 3D object is to print it using a 3D printer. A 3D printer is a device that allows you to obtain a volumetric object due to its layer-by-layer creation (fusion, growth). The most successful ways of using this technology in professional activities are known, for example, when replacing a part of the body bone, retina, auricle, a 3D technology for growing individual organs and tissues is being developed, and others.

3) Reproduction by static or dynamic elements of educational information.

a) Static visual elements of educational information - include structures with changing parametric characteristics. An example is the following chain: crop-scaling-positioning;
b) Dynamic visual elements of educational information - include structures with a time (or cause-and-effect) length. An example is the following chain: linear – nonlinear – real time.
Let's characterize the techniques of static display of information. Cropping - choosing the borders and aspect ratio, cropping parts of the image in order to focus on the main details. Scaling - resizing an object while maintaining its proportions. Positioning - determining the place of something, its relationship with other objects. An example can be a change in the angle of the image: outside the house - inside the house, changing the role in a certain activity (for example, a computer game): the player is an observer, and more.

Let's characterize the techniques of dynamic display of information. Examples of a linear structure are visual elements that have a temporal extension from the past to the future, or from cause to effect, and others. It is used in the educational process when the trainees do not have enough knowledge in the studied area. Examples of nonlinear structure are elements of processes and phenomena characterized by the absence of linear dynamics of their change (hierarchy, deduction, quantum transition, etc.). An example of a non-linear presentation of material can be educational information presented in the format of an HTML document (site). Non-linear presentation of material is used when students have basic knowledge and is focused on in-depth study of individual issues.

An example of the presentation of educational information in real time can be videoconferences, webinars. Video conferencing (VCS) is a telecommunication technology that provides video communication between subscribers over a data transmission network. Subscribers can also broadcast telemetric data (teleconference), documents, presentations and others. Video conferencing provides an opportunity for professional communication in real time, regardless of the location of the subjects, which provides a significant advantage over traditional methods of information transmission (for example, remote diagnosis of a human disease, distance learning, etc.).

Information theory and the experiments carried out, in which the relationship between the amount of information received and the amount of information processed, was studied, showed that when information is overloaded, the perception curve tends to a certain limiting value, and then a pronounced decline occurs. Therefore, in the educational process of higher education, for the successful formation of experience with fundamental and applied educational information, it is necessary to adequately select the characteristics of the visual elements of educational information corresponding to future activities.

On the basis of the above ideas and the author's position on the substantiation of the scientific component of the educational technology of visualization of educational information, as well as the classification of visual elements of educational information, we concretize the leading requirements for the educational technology of visualization of educational information in higher education. The pedagogical technology of visualization of educational information in higher education must guarantee the diversity of the composition and ensure the structuring of educational information, as well as the achievement of the required quality of visualization of educational information in higher education.

Let us show the ways of constructing and the results of highlighting the following requirements for the visualization of educational information. The ways of

constructing the requirements that underlie the pedagogical technology of visualization of educational information in higher education are based on a modern interpretation of the principles of teaching that guide pedagogical activity. As mentioned above, the principles of visibility, fundamentalization and professionalization are at the heart of the educational process using the visualization of educational information.

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The appeal in the educational process to the formation of experience in working with fundamental and applied visual educational information is associated with the main problem of modern education - it is the complexity of comprehending and processing significant amounts of information. Therefore, in the educational process of higher education, significant attention should be paid to this issue.

The basis of the requirements for the pedagogical technology of visualization of educational information, which are based on a systematic approach and aimed at the formation of experience with fundamental and applied visual educational information, are based on the theoretical calculations and provisions of system analysis applied to the educational process of higher education.
Accordingly, the following leading requirements for the pedagogical technology of visualization of educational information are distinguished: a) guaranteeing a sufficient variety of the composition of educational information, b) ensuring the structuring of educational information in accordance with its scientific, fundamental and applied orientation; c) achieving the required quality of visualization of educational information in higher education by displaying the features of its presentation in the chosen field of activity. Let us reveal the requirements indicated above, which are built taking into account the ways of displaying information in the educational process of higher education.

Let us clarify the requirement to guarantee a sufficient variety of the composition of educational information. The diversity of the composition of educational information presupposes both taking into account a broad erudition and taking into account a narrow specialization. Accordingly, it is useful for each category of students to present visual illustrative material that they understand. And, therefore, diversity in the presentation of educational information is necessary for better achievement of educational goals and is associated with different initial experiences of the student audience. At the same time, the priority is the modern interpretation of the principle of visibility, the implementation of which in a generalized form is presented as a harmonious and optimal combination in the educational process of concrete and abstract, visual verbal and practical teaching methods.

Let us clarify the requirement to ensure the structuring of educational information in accordance with its scientific, fundamental and applied orientation. This provision corresponds to the principles of fundamentalization and professionalization of higher education, which requires reflection not only of the scientific and fundamental, but also of the applied orientation of educational information. The development of science-intensive and high-tech production, the emergence of technologies for the search and selection of information require the involvement of workers who have experience in working with fundamental and applied information. The formation of the required experience of working with visual educational information is achieved by combining the rational and emotional in learning, in the process of reproductive and productive activities in visualization conditions.

Let us clarify the requirement to achieve the required quality of visualization of educational information by reflecting its features of its presentation in the chosen field of activity. This provision reflects the professionally oriented nature of the visualization of educational information, takes into account the specific features of the chosen field of activity, contributes to the formation of individual experience in working with visual educational information. This is achieved by taking into account the individual characteristics and preferences of the subject of education, using visual elements that adequately reflect the characteristics of the chosen field of activity, productive forms and methods of teaching.

The requirement for a variety of composition and the provision of structuring and professional orientation of educational information is necessary for the successful formation of experience with visual educational information.

3. CONCLUSION

So, the article revealed a systematic approach to the presentation of educational information, substantiated the scientific component of the pedagogical visualization technology. It is shown that the system-forming factor of the pedagogical visualization technology is the aggregate scientific-fundamental and applied educational goals. It was revealed that the visualization of educational information is also a system. Visualization is based on the principle of visibility, which in higher education is complemented by the principles of fundamentalization and professionalization.

It is shown that the visualization of educational information reflects the content of education. The source of the content of education is the pedagogically adapted social experience of mankind, which is revealed by modern researchers according to the levels of its formation: general theoretical understanding; subject; educational material; learning process; personality structure.

It is shown that it is advisable to consider the visualization of educational information within the framework of the system approach from the standpoint of system analysis, describing it from three points of view: functional, morphological and informational.

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