Technologies of Visualization of Educational Material – One of the Ways to Form Information Competence

Olena STEPANENKO[1]
Hryhorii DZHEVAHA[2]
Iryna HOLIIAD[3]
Olha MIROSHNIKOVA[4]
Volodymyr DYNKO[5]
Olha LILIK[6]

[1] Candidate of Philological Sciences, Associate Professor, Professor at the Department of Social and Humanitarian Education, Communal Institution of Higher Education «Dnipro Academy of Continuing Education» of Dnipropetrovsk Regional Council, https://orcid.org/0000-0003-0887-5808, olena.step@ukr.net

[2] PhD in Pedagogical Sciences, Assistant Professor, Department of Pedagogy, Psychology and Methods of Technological Education, T.H. Shevchenko National University «Chernihiv Colehium», Educational and Scientific Institute of Professional Education and Technology, https://orcid.org/0000-0001-6853-885X, dzhevaga.g@gmail.com

[3] PhD in Pedagogical Sciences, Associate Professor, Senior Researcher, State Scientific Institution "Institute of Education Content Modernization", https://orcid.org/0000-0003-4979-828X, goliyad-ktnk@ukr.net

[4] Associate Professor of Department of Normal and Pathological Morphology, State Biotechnological University, https://orcid.org/0000-0002-8371-9023, olgamal1909@gmail.com

[5] PhD in Pedagogical Sciences, Director, State Vocational and Technical Educational Institution "Boryspil Vocational Lyceum", https://orcid.org/0000-0001-6773-0540, volodimir_dinko@ukr.net

[6] Doctor of Pedagogical Sciences, Associate Professor, Professor of the Department of Ukrainian Language and Literature, T.H. Shevchenko National University "Chernihiv Colehium", https://orcid.org/0000-0002-5187-1944, lilik8383@ukr.net

Abstract: *The urgency of the article lies in the substantiation of the importance of using visualization technology in the process of education in the current period, defining the difference between this technology and the principle of visualization at the lesson in the today's educational institution. The article covers the concept of information competence and its components, describes techniques of visualization technology of teaching material, aimed at forming this competence. Special attention is paid to the methods of visualization at a lesson for the purpose of better knowledge assimilation. The article also describes different ways of visualization of educational information as a prerequisite for successful teaching of school subjects. The data contained in the article are the results of the analysis of digital services of visualization of educational content and the study of methodological foundations for the use of all kinds of information visualization tools at different stages of learning during the present lesson. The article covers in detail the most modern ways and means of information visualization, including mental maps, timelines, etc., because enormous information flows require the ability to assess this information, to determine its reliability and trustworthiness, to determine the main thing in it. The content of the article is of practical importance for teachers of today's schools.*

Keywords: *Digital services, visualization of learning information, mental maps, timelines, multimedia presentations.*

Introduction

The importance of researching and implementing visualization techniques in today's classroom is that society is experiencing a rapidly increasing flow of information, which is doubling every few years. Today, information in the classroom has become not only an essential component for global economic and political development, but also a basic component for the personal development of each individual. It is a resource for education at all levels, including the inclusion of the child in scientific and creative activities, which, in turn, creates a platform for the development of science, technology, and art.

Huge flows of information require the ability to assess this information, to determine its reliability and trustworthiness, to determine the main thing in it. In society and education there is a new concept - a competitive personality, one of the characteristics of which is a person or child who knows how to work with information, has a high level of information competence.

A competitive personality can be formed at school by teaching children to work creatively with information, which is an integral part of the learning process, and knowing how to select the necessary information by visualizing learning information. Visualization is one of the effective technologies to enhance learning.

The analysis of studies by foreign and domestic scientists and practitioners working within the framework of this issue gives grounds to argue that D. Lapp (2018), I. Stukan (2017) in their scientific works prove, means of visualization of educational material allow to present information in a reduced and processed visual form a special way to motivate communication due to the possibility of describing all components and components of the object of study. B. Vovk (2021) explores electronic resources that can be used in the visualization of learning material in the classroom, indicates the advantages and disadvantages of individual platforms, concludes its own recommendations on the effectiveness of using some of them. R. Hurevych, Shakhina, and Podzygun (2020) describe in detail how the electronic platform GOOGLE CLASSROOM can help in visualizing learning material and presenting the created visual material in the classroom, point out the pros and cons of this work. Y. Zhurat, L. Lipshyts, M. Soter, L. Chumak, H. Tarasenko (2020) explore the development of professional subjectivity of elementary school teachers in the process of visualization in the context of the neuro-pedagogical approach, present

extensive research in artificial intelligence and neuroscience during visualization of educational material.

The purpose of the article is to study and justify the importance of visualization of educational material in today's learning environment, the study of visualization technologies of educational material as one of the ways to form information competence, presenting methodology and methods of researching the use of visualization tools of educational information.

The study of this issue used theoretical methods: analysis and synthesis of the literature on the problem of research.

The value of this scientific research is the allocation of technologies of visualization of educational material as one of the ways of formation of information competence, presentation of methodology and methods of research of use of means of visualization of educational information.

Technologies of visualization of educational material - one of the ways to form information competence

Information competence is the ability and ability to independently search, analyze, select, process, and communicate necessary information using oral and written communicative information technology. Information competence is a personal characteristic expressed in the ability to seek, promote the storage and application of information in its various forms. It is important to note that information competence is not limited to the ability to work with a computer. And the ability to work with information is an obligatory educational result in the system of requirements for a present lesson (Matyuhin, 2018).

The technique of visualization of educational material is one of the ways to form information competence.

F. Leser (2018) argues that the greatest strength of assimilation of program material is achieved when teaching information is presented simultaneously in four codes: pictorial, numerical, symbolic, and verbal.

L. Kartashova (2018) proves that the term "technology of visualization of educational information" was proposed by Doctor of Pedagogical Sciences G.V. Lavrentyev determines that the main educational task of professional educational institutions nowadays is training competent specialists with skills to operate with considerable amounts of information, who are ready to learn throughout their lives.

Visualization is the process of presenting data in the form of an image in order to maximize ease of understanding and assimilation. Learning material, above all, requires concreteness, so this goal corresponds to

different types of visualization: object, abstract, conditionally-significant (Barakhsanova et al., 2018).

Today's children who read little tend to receive information through a picture, an image. Psychologists say that 80% of modern students are visual learners. The leading type of memory of 11-16 year old students is figurative memory. Eyes of kids of today are trained by huge amount of video games, clips, images in social networks. The screen culture forms the clip mentality of the youth. Children perceive information through short, vivid images or messages. Clip thinking is a new phenomenon in the era of information technology, with pros and cons. It is a defensive response to an increase in information load. This is a new vector of development of the relationship with information. And this peculiarity of children should be taken into account and taken into account by the teacher (Melnyk et al., 2021).

Real life requires the use of technology to help overcome the "visual chaos", the formation of visual literacy and culture of children, critical attitude to information. This is very important now, when advertising, social networks, media sometimes manipulate the person, can easily impose a false image, such as a successful person, beauty standards, the image of the enemy, extremist, etc.

Today's educational institution should perform educational activities, taking into account the needs of society, as using innovative techniques institution contributes to the development of student success and motivation to learn, contributes to the implementation of the program and discipline, affect the development of professionalism of the teacher, the further growth and development of opportunities for the student (Ovcharuk et al., 2020).

Visualization as an effective current technology to facilitate the perception and use of educational information contributes to solving some pedagogical problems: provides intensification of learning, activates learning and cognitive activity, forms and develops critical and visual thinking, visual perception, imaginative representation of knowledge and learning activities, promotes knowledge transfer and image recognition, improving visual literacy and visual culture.

There are certain differences between visualization of learning information and visualization. The principle of visualization gives the student the role of the spectator, the object of the process. In lessons, using visual information, students are subjects of learning activities, sometimes authors of educational products, Demyanenko (2012).

Visual information is not just an illustration of the material being studied. It becomes an independent, alternative source in the classroom. Such information needs to be analyzed, comprehended, and sometimes generated independently. And, very importantly, the techniques of visualization of educational material are ways of counteracting clip thinking.

Presenting educational material in a visual, structured form allows you to learn new systems of notions and ways of action faster and more efficiently. New information is absorbed and remembered better when it is depicted in the visual-spatial memory system. Visualization technology contributes to the quality assimilation of educational material.

The concept of information competence has the following components: the ability to search for information, transform it; the ability to assess, determine the reliability of information; the ability to analyze, structure and organize it; the ability to use information and telecommunications technology; the ability to work with different information devices (Onishchuk et al., 2020).

Consequently, the ability to search for information, turn it formed in the students with the help of such techniques of visualization technology as the mapping of the term in the image, the method of remembering dates, scribbling.

The process of visualization is the process of wrapping up thought operations on a visual image, coding information from textual, verbal to graphic. Visual images are not an illustration of the author's thoughts, but the ultimate manifestation of thinking itself. The technique of reflecting a term in an image is based on this principle.

In the course of such work with the term, students gain their own experience of creative activity. And one more thing - nowadays specialists in various fields of activity are required to be able to turn oral and written information into visual information. This is a new demand of today's society that should be considered in education (Kademia & Shahina, 2021).

The meaning of the term in one or more letters in the visual image reflects the meaning of the concept, its characteristics and characteristics. Most often the image is played out in a letter, the spelling of which should be memorized.

Based on the capabilities of current digital platforms and services that can be used in the process of foreign language education, we highlight the following principles of selection of digital educational resources for their use in the educational process (Tkachuk, 2021):

1. The principle of correspondence to the level and content of training, assuming the presence of the same topics or lexical units in the

already developed application. Digital services, as a rule, have the function of search and selection of applications and interactive tasks according to certain parameters, the most relevant of which are the topic of the lesson and the level of the group. Choosing one or another way of learning on digital platforms, the educator must understand and analyze them in order to adapt them in their groups.

2. The principle of methodological purpose of digital resources is aimed at the development of communicative competence through the improvement of language skills. The specificity of current approaches is not only the use of relevant texts and vocabulary in educational tools, but also in different ways of presenting educational material: in the form of a cloud of words, a scheme, an interactive whiteboard, etc.

3. The principle of expediency of development and use of a digital educational resource/application implies a rationale for its development and implementation in the educational process. This principle defines the goals and objectives of a particular tool, because its development and use cannot be an end in itself. With all the variety of digital learning resources, it is important to choose and adapt to the educational process those that contribute to the intensification of memorization of educational material, automation of control and help in organizing and conducting online lessons.

The widespread spread of information technology, the digitalization of all spheres of human activity, the speed and volume of transmitted information, new ways of presenting it in graphic and visual form affect the content of education. Current digital services open up opportunities to integrate visual aids and interactive tools, which allows teaching school subjects and learning subjects with the most effective result. This integration is possible through the use of text, graphics, animation, sound, and video in one learning application. Students love the use of multimedia audio-visual media in learning, which has made digital services a prerequisite for any teaching methodology in any school subject. And these services are applicable for at least two purposes: to increase students' interest and motivation, as well as to improve their retention of any learning information presented in an interactive learning medium.

The development of such tools is based on ways to edit and organize learning information, through which the teacher has the opportunity to present and process it in a form suitable for learning, namely (Gerasymova et al., 2019):

- visualize learning material in the form of separate objects with lexical units (words, phrases, collocations, idioms, text), pictures, diagrams, charts, memory maps, timelines; presentations;

- organize work with these objects online: move them, arranging them in a certain way; replace an object by superimposing another one on it; relate different objects to each other; enter comments and notes on different objects with lexical units;

- work with audio and video materials, changing their duration by selecting only the desired part of the audio or video file;

- create interactive tasks for practicing listening, speaking, reading, and writing both separately and by combining these types of speech activity.

Methodology and methodology of research on the use of visualization tools of educational information

In current research on the methodology of using the means of visualization of learning information the difference between the concepts of "visualization of information" and "visualization of knowledge" is noted.

Visualization of information is a figurative reflection of academic knowledge or experience, merging into a story of some kind, allowing you to bring to the outside - the processes of cognition. The process of visualization of knowledge is aimed at understanding their structure and facilitating their deep processing.

Visualization requires students to combine their background knowledge, textual data, and creativity to create an image in their imagination that helps them understand what they are learning on a deeper level. In addition, many researchers have noted that visualization is an effective teaching method, develops critical thinking, and facilitates and enhances students' learning itself, which affects their overall success and provides them with the skills and abilities to solve important problems in their field of study (Sheremet et al., 2019).

Thus, visualization improves communication, develops critical thinking, and provides an analytical approach to various problems.

Let's consider ways to visualize learning information.

Word Cloud. Working with new vocabulary, practicing and training vocabulary units is an important aspect of a teacher's methodological work.

Recently, many teachers have been using word clouds for the lexical method of "drilling".

With its help students' attention is focused on a certain set of phrases and words on the topic being studied. In this case, each of them this set may differ due to the different associative series. The current situation in the field of digital technology offers a wide range of activities and tasks involving work with the word cloud. For example, the teacher has the

possibility of using the digital service Mentimeter to survey students about the associations they have during the study of a new topic.

This service processes the results of such a survey and presents them in the form of a word cloud, in which the most frequently used and used word associations are highlighted in large font, and rare and almost non-repeated words - in small font, Shahina (2017).

Another digital service that has recently gained popularity and enables word cloud work is the Quizlet platform. When using Quizlet, students log in and select the appropriate set of cards they need to process (these can be created by the teacher or other users of the service).

With its flexibility and customization options, Quizlet can be used at any grade level and in any classroom. The platform is a great tool for creating tests for face-to-face and distance learning, and multiple modes of operation and self-testing make the process easy and convenient. The service is "smart" enough to offer tasks for adaptive learning according to students' needs and proficiency levels.

Multimedia presentation. In a distance learning environment, presentations are of particular importance in the teacher's teaching and learning work.

Teachers have noted that students prefer colorful visuals and pictures that contain stories that can be related to previous experiences, familiar places, objects, people, events, or animals.

Nowadays, teachers have various resources in their arsenal for turning their explanations into compelling information: well-prepared slides increase students' motivation, fully and vividly reveal the topic under discussion.

Presentations can be used at different levels of foreign language teaching. They are used for practicing and practicing communicative skills. In universities, multimedia presentations are used to teach students new ideas and concepts and are thus a repository of information, which, in turn, is perceived by the recipient as a mental gestalt (visual series) that allows them to process information more fully.

Thanks to the presentation, the teacher has the opportunity to draw students' attention to the learning material. This is achieved through the visual presentation of the learning material in the form of slides with tables, graphical images, audio and video files, Demyanenko (2015).

In the distance learning format, the presentations act as an online textbook and can be used as a simulator for practicing reading, speaking, listening, and writing skills.

Moreover, presentations allow the teacher to organize didactically meaningful discussions that contribute to the development of different types of thinking and important thinking operations necessary for the full formation of speech competence.

Teachers nowadays actively use presentations with video and interactive elements. The didactic value of such presentations is very high, which is distinguished by many specialists. This is due to the fact that this type of multimedia allows you to implement a wide range of pedagogical technologies and teaching methods - from individual-personal to differentiated.

Mental cards (or memory cards) are a way of graphically depicting learning information to help memorize it by solving creative problems. Digital services allow structuring, recording, and, therefore, memorizing learning information through associations and connections, processing large amounts of learning material.

The use of mental cards enhances the didactic potential of the lesson, creates prerequisites for the development of creative and communicative activity of students and activates the processes of cognition and information processing (Zihanov & Kozachenko, 2019).

The use of such technology as a mental card has a positive effect on the level of motivation of students, develops their creative thinking and promotes better learning of the material.

Mental cards can be presented by the teacher himself/herself in a ready-made form. They help to summarize the material learned and develop the communicative competence of the students. An example of such a card is shown in the figure.

However, today's students, who are very literate and digitally educated, can easily make these cards themselves (both individually and in mini-groups) during class. This promotes a more dynamic flow of the lesson, creates a creative atmosphere, produces students' teamwork skills, and, of course, contributes to the development of communicative competence.

Infographics (timeline). Timeline is a type of infographics, which involves visualizing the process of development of any object of study. To create a timeline it is necessary to analyze a large amount of information, to highlight the main and the secondary, to design and provide the material in a digital form.

The chronological approach to the presentation of learning information implies linearity, orderliness, sequence of presentation of learning material, which includes different types of information: texts, video

and audio files, graphic images, etc. The timeline is ideal for presenting and visualizing the development of any process.

Research findings

The ways of using interactivity in learning in today's educational institutions are characteristic of all stages of learning, considering the work of digital online publications, highlights their original properties such as:

- hypertextuality;
- interactivity;
- multimedia.

On the basis of the above-mentioned properties we can distinguish the following types of presentation of learning information: information presentation services are characterized by hypertextuality, multimedia and interactivity and allow providing learning information in various forms (presentations, diagrams, files, etc.).

Conclusions

The importance of the article lies in the fact that it is proved: digital technologies of visualization of educational information used in teaching school subjects provide great opportunities not only to present easily remembered material in a well-worked out form, but also to increase learning motivation through the use of interactive learning environment. Through the use of interactive technologies and visualization of information in the learning process, all tasks of the lesson are solved: developing, educational and educational. This happens through the visualization of didactic materials in real time using digital technology.

The above-mentioned facts in the article allow us to argue that the interactive educational space that has been actively developing in recent years is able not only to arouse students' interest and motivate them to new academic achievements, but also to act as an active stimulator of mental activity, creative and critical thinking processes of students.

Moreover, the intensity of learning and frequent changes in students' activities, simply necessary for the present generation, reduces the likelihood of rapid fatigue.

It is concluded that such methods of information visualization as a presentation or a mental card contribute to the development of creative and critical thinking, skills of active speaking and teamwork.

The combination of traditional teaching methods and interactive methods of information visualization in appropriate proportions has a favorable effect on the educational process as a whole, as well as on learning activities and student success.

Acknowledgement

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