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CREATIVITY IN DIGITAL ENVIRONMENT. POSSIBILITIES OF APPLICATION IN THE EDUCATIONAL SPACE

Abstract. An important factor in the effective functioning of a modern person is their involvement in the digital environment. Especially valuable in our time is a propensity for creativity and self-expression. Under the conditions of quarantine caused by COVID-19 utilization of digital technologies in this process has become of great importance in the life of society. The article analyzes various points of view on the issue of digitalization of public relations and the place of a person in this process. In addition, the authors clarify the essence of the definition of digital creativity through the analysis of definitions of "creativity" and "digital environment". The definition of "creativity" is considered in such combination of directions of application: creativity as an innovation, creativity as a process, creativity as an ability, creativity as stages of thinking, creativity as a result of action. The authors note that digital environment is formed from the technical side (computer technology) and human interaction with it – both as a creator of this environment and as an inhabitant. The study notes that currently the place of a creative person in the digital environment can be represented as two poles and a range of options between them: the first pole is denying digital technology for their work, commitment to traditional materials and techniques, or blocking creativity; the second pole – transhumanism for creative processes – the willingness and desire to merge with digital technologies to be able to take full advantage of innovations, enhancing their capabilities (physical, mental, intellectual, etc.) through biotechnology and interfaces. There is a large number of options between these two poles – the use of computer technologies accompanying creative process (communication, publication, equipment); primitive programs for leisure self-realization (for any student on the phone) supplementing the traditional spheres of art and creativity with new digital capabilities (computer graphics, programs for creating and arranging music, virtual backgrounds, mapping and lighting scenarios in theater and dance) interaction of digital and physical space (augmented reality, architectural mapping) virtual reality as an alternative or analogue of physical or as a reflection of someone's mental and imaginative reality; non-invasive neuro-interfaces. It has been determined that one of the most promising areas for the implementation of creativity in the digital space is educational activity. The authors note that one of the most effective means to incorporate creativity in the digital environment is project activities. It is important to note that these activities should be varied and involve different digital tools and technologies.

Keywords: gadgets; education; project technologies; creativity; digital environment; digital technologies

Introduction. Digital space and technologies have already become a new tool in many spheres of human life, including creativity. Their development and the emergence of new segments are growing rapidly. In this regard, it becomes difficult to determine the boundary between the actual creative process and the primitive use of a set of functions. And is it possible to define these boundaries? Technically, you can use the same applications and the same functions both for creating a new piece and for changing someone else's source material in a couple of tricks (filters, masks and other pre-programmed effects). When does the creative process begin and just the choice of functions end? And can these concepts generally be considered separately in the digital space? All these questions require careful analysis and

study. In our research, we will focus on defining the main provisions of creativity in the digital space and will try to show it to be relevant for the field of education and interaction with other people.

Analysis of recent research and publications. Artificial intelligence instead of the author (Yegnanarayana, 2009)? Digital technologies have made it possible to create computer neural networks, which, in addition to other results of their application, also create new art objects (Kowatari et al., 2009). Neural networks are trained on a huge number of examples and can already produce content (Liang, 2015) that is indistinguishable from man-made (music written by algorithms; new images and photos compiled from other objects; videos that are sometimes indistinguishable from real reports or existing ones) people; texts, including in certain styles, genres, semantic fields (Nalyvaiko & Maliutina, 2021). Is it creativity, and if so, whose - human author or artificial intelligence? And what purpose and role remains for living authors (writers, artists, composers), if the neural network can create their works quickly, in a variety of ways, and "in a complex way"?

Lee M. & Chen T. (2015) in their study "Digital creativity: Research themes and framework" define digital creativity as creativity that manifests itself in all forms driven by digital technology. The relative novelty and interdisciplinary nature of the topic of researching digital creativity is still unclear. In this context, Lee M. & Chen T. (2015) conducted an empirical study to determine the scope and specificity of the topic by means of the technique of intellectual structure.

The authors analyzed more than three and a half thousand sources and tentatively identified the main research topics in order to facilitate the understanding and study of digital creativity at the present stage of cognition of this process. The result of this scholarly work is a framework that summarizes progress in digital creativity research and guides future research in different directions (Lee & Chen, 2015).

An important aspect that does not receive the attention of scientists is the creative application of interactive visual analytics. Research by Cybulski J. L. (2015) brings some clarity to the understanding of creativity associated with working with interactive visual analytics and the interaction of non-professionals with a large amount of data and information. Their scientific work focuses on various aspects of digital creativity, which are explored in the context of interactive visual analytics and its application for decision making and problem solving.

The proposed structure explores and combines a number of models of individual, social and objective creativity. It explains the challenges the analyst faces with fast-growing and ubiquitous digital data in order to explore it, identify its meanings and associations, and solve problems and make effective business decisions. Interactive visual analytics differs from other forms of digital creativity in that it uses analytical models, relies on analyst mental imagery, and involves an iterative process of generating and evaluating ideas in digital media, as well as planning, executing, and refining the accompanying activities. This process is also characterized as collaborative and social in nature as it includes analysts from data, problem and visualization domains who exchange ideas and actions during analytic activities (Cybulski, 2015).

An important factor in the process of understanding the creative process in the digital space is the definition of creative behavior. Hoffmann J., Ivcevic Z., & Brackett M. (2016) in the work "Creativity in the age of technology: Measuring the digital creativity of millennials" provided valuable data on this difficult topic. The authors point out that digital technologies and their numerous ways of application form a new area of human creative self-expression (especially for adolescents and young people for whom digital technology is the norm of life). The study indicates that to date, self-reported measures of creative behavior encompass more traditional forms of creativity, including visual arts, music or writing, but do not include

digital creativity. But the question arises, how to measure creative behavior in the digital space? To address this issue, the authors of the study cite the author's method - the Creative Behavior Questionnaire (CBQD). In support of the data obtained by Hoffmann (2016), the results of factor analysis are presented, which revealed 3 main factors: achievements in the field of digital creativity, everyday creativity in school and self-expressing digital creativity. The results indicate that CBQD can be used as an independent or complementary indicator of creative behavior (Hoffmann, 2016).

One of the most represented places for the manifestation of creativity in the digital space today is the educational environment. Students who study both at school and at universities need to develop creative and technical skills in the classroom. Interesting in our opinion is the study by Aguilar & Turmo (2019), which presents a systematic review of the literature on examples of social creativity and digital technologies embedded in science education. To this end, scientists selected 23 empirical studies from multiple databases. This sample underwent a peer review process to address the interconnectedness of key themes embedded in the following three research questions: (1) What roles of digital technology support collaboration and creativity in science education? (2) What forms of technology and technological features support and organize the above-mentioned creative processes? (3) What pedagogical principles guide the advancement of social creativity using technology in science education and involve all students? The results show that technology can play different roles in promoting social creativity: (1) as a teaching tool that facilitates some of the key scientific creative processes; (2) as a tool for shaping the creative thinking of students; and (3) as an environment that creates an enabling environment for collective creative processes (Aguilar & Turmo, 2019).

Unresolved aspects of the problem. An important part of the issue of creativity in the digital space, especially in our time, remains the definition of its essence and, most importantly, its practical application in the educational space

Purpose of the study. The aim of the study is to determine the current state of understanding of creativity in the digital space and its application in the educational space.

Presenting main material. There is no single definition of creativity. This concept can be viewed from different angles and paradigms. Several interpretations can be distinguished.

Creativity as innovation. Activities for the embodiment and implementation of images, concepts, ideas, values created in the imagination. Creation of a fundamentally new thing that did not exist before.

Creativity as a process. A combination of various elements, functions, techniques, objects not according to a certain algorithm or scheme, but for the purpose of self-expression, pleasure or achievement of aesthetic goals. There are various techniques (techniques) to improve the efficiency of this process. For example, TSIP (Theory of Inventive Problem Solving, Altshuller, 1984), brainstorming (De Bono, 1985), lateral thinking (De Bono & Zimbalist, 1970), freewriting, associations and mind maps, changing parameters and characteristics. The creative process can turn into a state of flow (the theory of Mihai Csikszentmihalyi, 1990), in which a person is fully involved in the activity and situation, experiences joy, satisfaction with his skills and the course of activity, is extremely concentrated, but not tense, can ignore basic needs (in sleep, food, others), does not notice the passage of time.

Creativity as an ability, creativity. A person's ability to make creative decisions, create and understand new ideas. Divergent thinking tests (e.g., Paul Torrance) are used to measure the main criteria of creativity (flexibility, fluency, originality) (Torrance, 1988; Torrance & Shaughnessy, 1998).

Creativity as stages of thinking. According to the theory of Graham Wallace, the creative thought process goes through four stages: the preparation period (when a problem is

discovered and the need to solve it), the incubation period (switching to other topics and processes other than the problem), the insight stage (finding possible solutions) and the verification stage (verification, assessment, technical issues for the implementation of the found solutions) (Sadler-Smith, 2015).

Creativity as a result of activity. Products of the creative process, created objects or works (Hennessey, & Amabile, 1998).

Note that there is no single, general definition of the term "digital space". However, there are different interpretations related not only to different areas of human activity, but also within each area.

The concept of "digital space" itself already consists of two separate, also far from unambiguous in the definition of the terms: "digital" and "space". The first, historically coming from "numbers" and everything that can be calculated, reflects the basic approach: the use of certain units of information and logical operations with them. The constantly transforming and multi-vector rapidly developing technological support for working with information units makes it possible to supplement the definition of "digital" with more and more new perspectives and areas of application. The main one for today is computer technologies and their derivatives: programming, algorithms and the results of their work. The second part, "space", is also used in many areas of knowledge and activities with different interpretations. The historically basic approach is space in the concept of a real place: premises, habitat, and territory. With the development of philosophy and science, new concepts have appeared: semantic space, psychological space, air and outer space, mathematical sets as different spaces, social space as all types of interaction of a certain group of people, and others. It is possible to define "space" as a basic concept: a system of elements with certain characteristics, relationships, qualities and functions - both with a specific physical localization and without it. A striking example of this is the Internet – a worldwide system for exchanging data through cellular networks and storing them in interconnected computer networks. Thus, by combining two separate concepts "digital" and "space", logical operations with information units by means of computer technologies and their processes and results, forming systems of interacting elements, fully or partially corresponding to certain characteristics and qualities, are added to the interpretation.

Initially, the digital space is formed by a person (hardware and software side), then it continues its development and functioning, including independently (algorithms, data collection and analysis, neural networks, artificial intelligence), and also becomes an object of active or passive attention of a person (creating this space, or user, or content consumer, or digital citizen). Anyone who interacts with digital technologies can be considered the inhabitants of the digital space. After digitalization by the multiply accelerated pandemic of 2020, the number of inhabitants of the digital space has increased dramatically due to the digitalization of most activities and social activities. The system has significantly increased the number of its elements – both human and software and hardware.

The digital space is formed from the technical side (computer technologies) and human interaction with them – both the creator of this space and its inhabitant. The interface "digital technologies – a person" is mainly screens and displays (that is, visual consumption of information), in a much smaller volume - speakers and headphones (auditory canal and auditory consumption of information). Neurointerfaces are being actively developed, after the widespread introduction of which both the digital space and many aspects studied by psychology and neurosciences will move to another level and will inevitably require a rethinking of the paradigm (primarily personality psychology, as well as physiology due to the growth of biotechnology in combination with their digitalization).

Media formats for creativity in the digital environment are both digital analogs of the usual formats, and fundamentally new ones (emerged only with the advent of the digital

environment). At the moment, the digital space already includes classical media elements: text, images, audio, video sequences, animation, hyperlinks and other interactive ways of providing data; as well as more and more new directional elements. Social networks (online platforms for digital communication of people), virtual reality (an alternative to physical space, formed through digital technologies, with the effect of being present in it for a person), three-dimensional graphics and animation, "motion capture" (both are widely used in the film industry), augmented reality (combination of physical reality and digital multimedia elements), mapping (dynamic three-dimensional projection onto physical objects). These phenomena have already become firmly established in the daily and professional life of the inhabitants of the digital space, especially the generation that does not know the world without digital technologies, that is, those born after the 1990s.

The structure of the global digital space based on the Internet connection, as well as the stages of its development, can be represented as follows (Kollmann, 2020):

- web 1.0 – sites (from personal to government), indexed by search engines and available to everyone;
- web 2.0 – "social web" or all social networks and platforms, cloud technologies;
- web 3.0 – semantic web, decentralized collective content creation, aggregator applications;
- web 4.0 – a neuronet being developed now, in which the interaction of participating elements (living beings, artificial intelligence and objects) is based on neurocommunication and intelligent virtual agents I2P or deep web - an invisible Internet, access to which only those who know exactly where the item you are looking for is found and has access rights; Various content that is not indexed by search engines – the Internet of Things (IoT), data transfer between objects, as well as the external environment, based on machine-to-machine interaction and cloud computing (Ashton, 2009).

The connection between creativity and digital space. All of the above concepts of digital space make it possible to enrich the creative process of a person with ever new facets and possibilities. However, at the same time, all the issues listed in the "Introduction" section are becoming more acute. For creativity and audiovisual arts, digital instruments are opening up new possibilities – both exclusively in the digital space and in combination with traditional techniques and materials. At different levels, digital creativity is available to anyone with a modern mobile phone (smartphone). Smartphones are a mobile creative studio that can, if desired, create new, non-standard, unusual creative products. Whether it will be a truly creative process, just digital leisure or procrastination depends on the person who uses them.

However, there are many creative digital directions, which require a greater technical base for large-scale or technically more complex implementations (for example, the creation of virtual three-dimensional pictures, or the technology of "motion capture", in which computer-generated characters duplicate the movements of living actors, and others). What is technically needed: hardware (gadgets, devices) and software (programs, applications). What is needed creatively?

Let us list the criteria for the professional suitability of creativity in the digital space when analyzing the creative works of graduates of the Academy of Media Arts (KHM) in Cologne, Germany (KHM, 2021):

- Perception – observation: the ability to sensitively perceive reality, visual and acoustic phenomena, to observe in detail the relationships, events and processes;
- Idea – imagination – form: the ability to develop visual, acoustic, linguistic, staged, performance or other fantasy, to imagine images, sounds and events and to embody them in artistically inspired forms, processes or dramaturgy;

- Implementation – concept: the ability to realize artistic and creative ideas, whether using media processes, hardware and technology, or through manual artistic techniques, as well as the ability to conceptually structure and organize artistic and media content;
- Reflection – rationale: the ability to reflect on perception, content, connections and work processes, as well as to understand social and historical connections, as well as the ability to explain, ask questions, choose, evaluate and formulate one's own processes and results;
- Internet itself – is the largest and most significant in terms of scope of human creativity in the digital space, which meets all of the above definitions of creativity. It has also become an essential element in shaping the digital space.

Above were the criteria for high-quality digital creativity in the Academy of Media Arts (KHM). In contrast to them, the iOS classification considers the category of creative activity of the owner of a smartphone or laptop with the iOS operating system in terms of software. All applications and programs used by the Apple manufacturer that the owner of the device uses can be found in the settings (options – screen time – program categories – creativity). This category includes a camera, photo gallery, and any applications for processing and creating visual content, video and audio processing (as opposed to a voice recorder, that is, recording speech without processing or musical compositions). Creation of texts is not included in the category of creativity.

The place of the human being in digital creativity. The emergence and development of digital technologies is inevitably the cause of socio-cultural transformations, including creative processes and the role of a person in them. In the 70s of the XX century, the fourth information revolution took place (the invention of microprocessor technologies and personal computers) (Floridi, 2010), which led to the emergence of the digital space. As well as after the third information revolution (at the turn of the XIX-XX centuries with the advent of radio, telegraph, telephone), and after the second (the invention of book printing in the XV century), the ways of working with information are radically changing nowadays.

The reactions of individuals and the general public are very different, ranging from enthusiastic acceptance to fears that technology will replace and displace humans. The place of a specific person in the creativity of the digital environment directly depends on his personal characteristics and focus (which determines his positioning and the nature of digital creativity), as well as on the environment in which he is formed and located (which will determine the quality of access to technical and software resources as to tools for digital creativity, and the level of its manifestation) (KHM, 2021).

According to my own observations of a large number of inhabitants of the digital world (Ronzhes, 2021), at the moment the place of a creative person in the creation of a digital environment can be represented as two poles and a spectrum of options between them:

First pole. Denying digital technology for their creativity, adhering to traditional materials and techniques, or blocking creativity (Klinenberg, & Benzecry, 2005). Comfort, adherence to traditions, decades of skill in one's niche, striving for certainty and stability, level development in one's own direction, flowing state in the process of creativity, preference for an ecological natural lifestyle or "slow-life" – one pronounced of these indicators or a combination of several can lead to the refusal of the creative person to use digital technologies to express creativity. As a result, destructive phenomena such as frustration, decreased self-esteem, difficulty of social adaptation in changing conditions, fear of the future, fear of being insignificant or unnecessary in comparison with artificial intelligence and its work, fear of losing self-identification and self-esteem, leaving into yourself. Or constructive states of satisfaction with one's own path, authenticity and congruence with one's inner states, expressed through creative processes.

Second pole. Transhumanism for creative processes – the willingness and desire to merge with digital technologies in order to be able to fully benefit from innovations, enhancing their capabilities (physical, mental, intellectual, etc.) through biotechnology and interfaces (Vorontsova 2020).In creativity, this may look like a direct realization of mental images or psychophysiological states in the form of digital works. One or more of the following qualities are inherent in such people: lack of focus on their physical body, staying predominantly in the digital space, thirst for experimentation, sociopathy outside of digital communications, professional implementation mainly in the field of computer technology, denial or disregard of traditional values, creating a family only with like-minded people or a tendency to be solitary. As a result, there can be both destructive results (dissolution of one's own personality in digital characters, loss of one's authentication due to modification by neurointerfaces, ignoring ethical principles, leaving the non-digital environment), and constructive (creating amazing works of art in new formats that were not conceivable before the emergence of digital space, a huge selection of tools-tools for the implementation of a creative idea, the creation of new forms of art and their practical application, enriching both non-digital reality and all groups).

Thus, between these two poles there is a large number of options – the use of computer technologies in the accompanying process of creativity (communications, publications, equipment); primitive programs for leisure self-realization (for any student on the phone); the addition of traditional arts and creativity with new digital capabilities (computer graphics, programs for creating and arranging music, virtual backgrounds, mapping and lighting scenarios in theater and dance); interaction of digital and physical space (augmented reality, architectural mapping); virtual reality as an alternative or analogue of physical reality, or as a reflection of someone's mental and imaginative reality; non-invasive neurointerfaces.

Based on the trend in the development of creativity in the digital space and beyond it, the following conclusions can be drawn regarding the above scheme. At the first pole, artisans and amateurs will give way to digital technologies in the quality and speed of creative processes, or they will move into the field of leisure services or self-expression for themselves. Craftsmen and creators will remain valuable. Especially if they are presented in the digital community at least in the form of information about them (and then the geography of their admirers will not be localized by some place thanks to the World Wide Web). Over time, non-digital high-quality creativity can become a significant narrow niche for connoisseurs, especially those for whom communication with a real presence cannot be fully replaced by the various possibilities of digital technologies. The second pole, "transhumanistic", arose after the third information revolution at the beginning of the 20th century, after the fourth it received its development and is now making giant strides forward. Non-invasive interfaces and modules are less of a concern for the general public. Those that are embedded in the biological system of a person excite all levels of the psyche from deep (fears of a threat to the human species or the dream of creating a "new person") to everyday-conscious (how to practically learn to live with this and how safe is participation in experiments with new technologies and insufficiently investigated consequences).

Thanks to fundamental changes in all spheres of human activity and in creativity, including, as well as the erasure of territorial boundaries in communication in the Internet era, the formation of social groups is already proceeding according to the principle of common approaches, perception of the world, similarity of interests and also their place in digital creativity. space. Each such group has its own ecosystem, semantic field and value system. The study of such creative groups and their interactions, as well as cross-group analysis, can form the basis for further research.

An important factor in the practical application of creativity in the digital space is the acquaintance of a person (often young) with the possibilities of digital tools and gadgets.

After all, it is not enough just to be able to use a tool, you need to know all the possibilities that this tool has. In our activities related to education and the development of creativity in the digital space, we use design technologies (Nalyvaiko, 2021). In the process of implementing creative projects, students develop their creative skills in the most appropriate form and create unique digital content that helps to assimilate the theoretical knowledge gained in practice. It is also important to note the variability and relative availability of digital technologies, which greatly helps to level the property and digital divide among students (Zhernovnykova, 2020). The technology of educational interaction in project activities is based on such principles as: primary organization, current control of success, public defense and presentation of results, registration of the obtained results in digital content. The technology of successful project activity in the digital educational space includes the following stages: preparatory (establishing a connection between applicants and the teacher), operational (project creation), corrective (making changes and additions) and final (public defense and registration of results) (Nalyvaiko, 2021).

Consider the experience of project-digital activities in the walls of V.N. Karazin Kharkiv National University. With the average number of students studying in the second year of the School of Foreign Languages of V.N. Karazin Kharkiv National University, which is about 230 people a year, the number of applicants who participate in project-digital activities is about close to 200 students.

To develop their skills in the digital space (among which the leading place is occupied by creativity in the digital space), students choose the type and path of their project. An important aspect that helped to establish the need to use project-digital activities to develop the creativity of applicants was the monitoring of their success in further education, where students showed much greater perseverance in performing creative tasks, especially in forced distance learning.

Types and ways of realization of project-digital activity are presented in Table 1.

Table 1

Types and ways of realization of project-digital activity

№	Name of project-digital activity	Ways of realization in the educational process
1	Research of problems and prospects of introduction of digital technologies in educational process of educational institutions of Ukraine or other countries.	This may be a project aimed at creating a site with guidelines for future teachers (students) or young teachers in the field of teaching. It can also be games or web quests created using mobile or computer tools. With the subsequent presentation of the received results.
2	Development of "Foresight projects" in education.	Using the "Delphi" method to determine the prospects for the development of education and pedagogy in the next 5-10 years (in the format of a faculty, several faculties or a university).
3	Didactic game	The game can be created by analogy with the game "Lotto" or "Who wants to be a millionaire" (interactive presentation). Situations, tasks and questions for games can be accompanied by music. Mobile applications such as Stop motion, etc. can also be used.
4	Development of a presentation or video on issues related to the comparison of educational systems	The presentation should show the distinctive or common features of educational systems on the example of a particular educational institution or

	of different countries.	system (school, university) of education in a particular country. That is, to define what is an "educational system" and how it is implemented in the school system and universities of Ukraine or other countries (number of slides 20-25, video up to 5-7 minutes). At the end of the presentation or video you need to indicate the list of sources used in the project.
5	Movie-discussion	On the example of the work of any teacher, for example: "Anton Makarenko's ideas in modern education and student life"). The film should include references to the ideas or experiences of prominent teachers in the context of current issues or prospects for educational activities.
6	Creation and description of cases (pedagogical situations and ways to solve them)	1. You need to create 5 case studies (3 about school + 2 about university) 2. Describe the problem situation. 3. Model the general perspective of the problem situation. 4. Present the correct solution to the situation with justification. 5. Creating a presentation of 3 slides for one case situation (1 slide to justify the problem + 1 slide for solutions + 1 slide for conclusions). * Points for the specified project are increased if it is submitted in the format of a video.

Some examples of already implemented projects can be found at the link to the YouTube channel "Creative pedagogy in the digital space" (https://www.youtube.com/channel/UCIwOqrMR3X1GRLQANSmiItA).

Discussion. The creative potential of the digital educational space is limited only by the capabilities of available digital content creation tools. In addition, project activities aimed at creativity in the digital space help students find new friends and like-minded people in any conditions, even in such conditions as quarantine restrictions. After all, there are no boundaries and distances for digital technologies. Along with digital creativity in such conditions, the skills of teamwork and co-creation are also developing as an important factor in the further integration of students into public life.

One of the most expressive ways of developing creativity in the younger generation in the digital space is "Stop Motion" projects (Nalyvaiko, 2019). To realize your creativity in the learning process, Stopmotion technology allows you to use the most standard tools and digital devices. The use of "Stop Motion" applications in training has a number of advantages:

- Ease of producing animated films with the use of "Stop Motion" applications allows students to show the applied value of mobile devices not only for entertainment but also for knowledge, skills and abilities, which is in stark contrast to the traditional method of creating animation, which takes a lot of time and effort.
- Versatility for use in the study of various subjects of the educational cycle, both humanities and natural sciences. In particular, animated films are suitable for explaining complex topics related to the phase of the movement of stellar objects, or consideration of a major historical period and its events.

– Openness to discussion and understanding of the received digital content. It is useful to organize a digital exhibition of works by students, where they can consult with their peers and teachers to improve their skills in creating "Stop Motion" films. In addition, uploading your own films to social networks and websites (YouTube, Facebook, Instagram, etc.) becomes a great opportunity for public review of their work and serves as an additional incentive to use digital tools in learning and communication (Sun, Koun-Tem, 2017).

What could be more creative in the 21st century than creating your own stories in the digital space? At a time when it is very difficult to interest students in learning, it is necessary to look for new approaches and means of implementing creativity in the learning process. As the experience of curating students undergoing internships in educational institutions has shown, Stop Motion technology has allowed interns to significantly raise interest in the material they have been trying to convey to school students. As mentioned above, the use of "Stop Motion" does not require significant material costs, which allows more widespread use of this tool to develop the creativity of participants in the educational process.

An important factor in successful creative activity is its measurability and visualization for greater understanding by the subjects of the educational process. The article (Hoffmann, 2016) provided at its core a methodology CBQD for measuring these processes. This technique acts as one of the valid indicators of digital creativity in adolescents. This metric can be used alone or in addition to other indicators of creative behavior. In this age of technology, criteria for creativity that do not include digital creative sources may miss the opportunity to learn about the many ways in which adolescents express their creativity (Hoffmann, 2016).

The COVID-19 pandemic has brought new opportunities to the learning process and significantly expanded the range of creative applications of the knowledge gained by students. For example, creating their own educational content allows students to feel their importance for further learning, not only themselves, but also their colleagues. It is also important to note that the blended learning format allows you to realize the full potential of mobile learning tools and helps to realize the didactic potential of your mobile gadgets, which also positively affects further learning (Bardus et al., 2021).

It is very important to note that not all scientists have a positive attitude towards digital creativity and the dominance of digital technologies in human life, as it is indicated that excessive involvement in the digital world can lead to "technostress" and technology fatigue (Tarafdar, 2015). The fight against these negative manifestations of digitalization in most areas of human life in the future may lead to the emergence of new areas and professions aimed at maintaining the psychological and physical health of users. In addition, it is important to emphasize the importance of digital hygiene and the prevention of computer anxiety among both students and adults.

This study is devoted to highlighting the basics of developing a professional e-portfolio as a means of developing the creativity of a foreign language teacher to improve his professional skills, meet professional needs, deepen, expand and update relevant general and special knowledge and skills (Kulichenko, 2018).

According to Kulichenko A. K., Sotnik T. V., Stadnychenko K. V. (2018) creating an e-portfolio, which is a means of creativity, foreign language teachers must demonstrate a holistic set of knowledge, skills and abilities. The process of creating an e-portfolio is quite complex, so the teacher must know, be able to implement many digital elements in this process, in particular:

1) know:

– components and basic requirements for creating an electronic portfolio of a foreign language teacher;

- the essence, structure, scientific approaches and conditions for the development of personality creativity;
- components of creative teaching;
- features of the development of creativity of pupils (students) in the process of foreign language speech activity and during the teaching of vocabulary and grammar;
- features of the development of creativity of pupils (students) in the process of foreign language speech activity and during the teaching of vocabulary and grammar;
- capabilities of modern CMS-platforms for the implementation of electronic portfolio in the form of a web resource;
- the main ways of publishing own materials by means of modern web services;

2) be able to:
- record, evaluate and self-evaluate personal achievements in the professional sphere;
- create conditions for the development of personal creativity in the school;
- use one of the CMS platforms to compile own e-portfolio;
- use modern web services to publish their own materials;
- to design an electronic portfolio of a specialist by means of modern CMS systems;
- publish their own developments by means of Internet services and include them in the portfolio;

3) be:
- knowledgeable in the field of modern research on creativity in education;
- motivated to use modern achievements in the development of creativity of pupils (students), in particular by e-means, in the organization of the educational process;
- focused on increasing the level of their own professional and pedagogical competence in the development of creativity (Kulichenko, 2018, p. 300).

Referring to their own experience in implementing the technology of creating an e-portfolio, it should be noted its practical significance for students in their future professional activities and especially in the implementation of the right to academic mobility. When creating an e-portfolio, students get acquainted with the recommendations adopted in the European Union in the Europass e-Portfolio Concept Note at the link (https://ec.europa.eu/futurium/en/system/files/ged/epass_2-3_europass_e_portfolio.pdf). After that, within a certain period of time, students develop their own e-portfolios for prior review in the format of a Google document and demonstrate their work in public defense. This form of interaction can significantly enrich the experience of creative presentation of their own history. The most commonly used tools for creating e-portfolios are WordPress, Google Sites, Evernote.

One of the most important factors in building a working technology for the manifestation of creativity in the educational process is the study of the interaction of the main components of creativity and cooperation in the digital environment in the design process. The structure is based on the component theory of creativity Amabile T. M. (2011), which consists of three intraindividual components of creativity and social environment. The digital environment as a social component of creativity provides the technical infrastructure for the analysis of data related to creativity and collaboration. In the context of these ideas, the studies of Karakaya A. F., Demirkan H. (2015) become valuable. In their work "Collaborative digital environments to enhance the creativity of designers", the authors cite data that indicate that

the component of the social environment, called responsiveness to proposals, is closely related to the generation of ideas as a creative relevant component of the process and group interaction as a component of task motivation. ... In addition, the number of sketches and design ideas generated by criticism has been found to be the main design issues that enhance creativity in a collaborative digital environment (Karakaya & Demirkan, 2015).

In the process of developing creativity in the digital environment, it is important to choose the right tools for this process. One such tool could be digital manufacturing laboratories (FabLabs). Fully realizing the most creative ideas at FabLab requires a fundamental understanding of the processes at FabLab. To achieve this goal, Georgiev G., Sánchez Milara I., & Ferreira D. (2017) propose such a structure for dynamic and ubiquitous recording of interactions between a person and a group of people (team), human interaction with a tool / machine, and human interaction with a design object in complex scenarios that arise in the creation paradigm in FabLabs. The authors propose three methods of interaction in the digital space in the development of creativity using FabLab. The first method creates categories of creative spaces about actions and users in FabLab. The second method defines the interactions between users and tools, as well as between users. Finally, the third method identifies deep cognitive and thinking types of creators in FabLab. The proposed structure can improve the creative outcomes and experiences of all stakeholders in the FabLab creation process and enable easy customization of FabLab training for different audiences (Georgiev, 2017).

Conclusions. Thus, we can conclude that creativity in the digital space and especially in the digital educational space has a tremendous potential for development and improvement. In the 21st century (Henriksen, 2016), technology will take up more and more time and space in our lives and we will need to decide for ourselves to accept these changes or try to maintain the traditional way of life. But it is important to remember that in a time when children from the very birth have access to digital technologies and gadgets, it will be more and more difficult to convince the younger generation of the importance of their creative potential beyond digital development, and this challenge will need to be addressed by the next generation of teachers.

It should be noted that understanding the patterns of creativity in the digital space requires further research and implementation of effective means of deeper interaction in the digital space. The process of continuous and effective development of creativity in the digital space involves continuous systematic work, the use of holistic technology of interaction between participants in the educational process that would integrate and meet the training needs of future professionals with their own clear vision of social processes in offline and offline world.

In future scientific research, it is planned to show the degree of student involvement in the creative process in the context of the use of immersive learning technologies and the creation of educational content.

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ТВОРЧІСТЬ В ЦИФРОВОМУ ПРОСТОРІ. МОЖЛИВОСТІ ЗАСТОСУВАННЯ В ОСВІТНЬОМУ ПРОСТОРІ

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Анотація. Важливим фактором ефективного функціонування сучасної людини є її долученість до цифрового середовища. Особливо цінним у наш час є здатність до творчості та самовираження і в умовах карантинних обмежень викликаних COVID-19 застосування цифрових технологій у цьому процесі займає велике значення у житті суспільства. У статті аналізуються різні точки зору щодо питання цифровізації суспільних відносин і місці людини у цьому процесі. Крім того, автор розкривають суть визначення цифрова творчість через аналіз визначень «творчість» та «цифрове середовище». Визначення «творчість» розглядається у такій комбінації напрямків застосування: творчість як новаторство, творчість як процес, творчість як здатність, творчість як етапи мислення, творчість як результат діяльності. Автори зазначають, що цифровий простір формується з технічного боку (комп'ютерні технології) та взаємодії з нею людини – як творця цього простору, так і його мешканця. У дослідженні зазначається, що на даний момент місце креативної людини в творчості цифрового середовища можна представити у вигляді двох полюсів і спектру

варіантів між ними: перший полюс – заперечення цифрових технологій для своєї творчості, відданість традиційним матеріалам і технікам, або блокування креативності; другий полюс – трансгуманізм для творчих процесів – готовність і прагнення злитися з цифровими технологіями, щоб мати можливість в повному обсязі користуватися нововведеннями, посиливши свої можливості (фізичні, психічні, інтелектуальні тощо) за рахунок біотехнологій і інтерфейсів. Між цими двома полюсами знаходиться велика кількість варіантів - застосування комп'ютерних технологій в супутньому творчості процесі (комунікації, публікації, обладнання); примітивні програми для дозвільної самореалізації (у будь-якого школяра в телефоні); доповнення традиційних сфер мистецтва та творчості новими цифровими можливостями (комп'ютерна графіка, програми для створення і аранжування музики, віртуальні фони, меппінг і сценарії освітлення в театрі і танці); взаємодія цифрового і фізичного простору (доповнена реальність, архітектурний меппінг); віртуальна реальність як альтернатива або аналог фізичної, або як відображення чиєїсь психічної і образної реальності; неінвазивні нейроінтерфейси. Визначено, що одним з найперспективніших напрямів реалізації творчість у цифровому просторі є освітня діяльність. Автори зазначають, що одним з найбільш дієвих засобів реалізації творчості у цифровому просторі є проектна діяльність. Важливо відзначити, що ця діяльність має мати варіативний характер та залучати різні цифрові засоби та технології.

Ключові слова: гаджети; освіта; проектні технології; творчість; цифрове середовище; цифрові технології