INFLUENCE OF DIGITAL EDUCATIONAL RESOURCES ON DIDACTIC POSSIBILITIES FOR THE EDUCATIONAL PROCESS (ON THE EXAMPLE OF ENGLISH LANGUAGE)

INFLUÊNCIA DOS RECURSOS EDUCATIVOS DIGITAIS NAS POSSIBILIDADES DIDÁTICAS PARA O PROCESSO EDUCATIVO (COM A LÍNGUA INGLESA COMO EXEMPLO)

INFLUENCIA DE LOS RECURSOS EDUCATIVOS DIGITALES EN LAS POSIBILIDADES DIDÁCTICAS DEL PROCESO EDUCATIVO (SOBRE EL EJEMPLO DE LA LENGUA INGLESA)

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ABSTRACT: The effective organization of the educational process in the context of rapid acceleration of the society's digitalization is impossible without increasing its digital literacy. Consequently, it is necessary to study the current state of digital literacy, and to seek and implement new learning models in the educational system based on the application of modern innovative technologies and digital teaching methods. This research aimed to study the level of teachers' digital literacy, as well as opportunities and future trends in digital didactics. Two major methods have been used: development of an abstract-logical model and a survey in order to measure the level of digital literacy of teachers and educators in Ukraine. The analysis of the survey data has revealed that teachers and university professors have reached the highest level of digital literacy, which is significantly higher than the average Russian level.

KEYWORDS: Digital technologies. Digital literacy. Teaching and educational process. Didactic opportunities. The cutting-edge technology in teaching.

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RESUMO: A organização eficaz do processo educativo no contexto da rápida aceleração da digitalização da sociedade é impossível sem aumentar a sua literacia digital. Consequentemente, é necessário estudar o estado actual da literacia digital, e procurar e implementar novos modelos de aprendizagem no sistema educativo baseados na aplicação de tecnologias modernas e inovadoras e métodos de ensino digitais. Esta investigação visava estudar o nível de literacia digital dos professores, bem como as oportunidades e tendências futuras na didáctica digital. Foram utilizados dois métodos principais: desenvolvimento de um modelo lógico abstracto e um inquérito a fim de medir o nível de literacia digital de professores na Ucrânia. A análise dos dados do inquérito revelou que professores da educação básica e professores universitários atingiram o nível mais elevado de literacia digital, que é significativamente mais elevado do que o nível médio russo.

PALAVRAS-CHAVE: Tecnologias digitais. Alfabetização digital. Ensino e processo educativo. Oportunidades didácticas. A tecnologia de ponta no ensino.

RESUMEN: La organización eficaz del proceso educativo en el contexto de la rápida aceleración de la digitalización de la sociedad es imposible sin aumentar su alfabetización digital. En consecuencia, es necesario estudiar el estado actual de la alfabetización digital, y buscar e implementar nuevos modelos de aprendizaje en el sistema educativo basados en la aplicación de modernas tecnologías innovadoras y métodos de enseñanza digital. El objetivo de esta investigación es estudiar el nivel de alfabetización digital de los profesores, así como las oportunidades y tendencias futuras de la didáctica digital. Se han utilizado dos métodos principales: el desarrollo de un modelo abstracto-lógico y una encuesta para medir el nivel de alfabetización digital de los profesores y educadores de Ucrania. El análisis de los datos de la encuesta ha revelado que los maestros y profesores universitarios han alcanzado el nivel más alto de alfabetización digital, que es significativamente más alto que el nivel medio ruso.

PALABRAS CLAVE: Tecnologías digitales. Alfabetización digital. Proceso docente y educativo. Oportunidades didácticas. La tecnología de vanguardia en la enseñanza.

Introduction

At the beginning of the 21st century, decisive changes have taken place due to the intensive use of new technologies in education. The global network has a stronger impact on the daily lives of people and society. According to particular estimates, hundreds of millions of personal computers and other mobile devices (for example, personal digital equipment, and mobile phones) are now connected to the global network. We are witnessing the emergence of a new phenomenon—a global virtual educational community of more than one billion people, and this number is steadily growing (CHOSHANOV, 2013).

Currently, digital literacy has become very popular in educational institutions and among students. The huge leap in technology has brought significant changes to our daily lives, one aspect of which allows us striving towards digital citizenship. Consequently, the gap in the

availability of digital devices should be reduced, and access to technologies should be expanded in order to create equality in the society. When students can extensively use media and technology in order to interact with their environment, their personal environment is greatly enhanced and helps them to integrate. They gain competence in researching, exploring and creating their own digital artwork using modern, affordable tools. It expands knowledge to facilitate lifelong learning in digital learning environments (KAEOPHANUEK; NA-SONGKHLA; NILSOOK, 2019).

Due to the opportunities provided by information and communication technologies (ICTs) in modern education, many multimedia and interactive educational products are being developed in online education (e-learning) (MHOUTI; ERRADI; NASSEH, 2013).

Modern information technologies are becoming one of the most important tools for school modernization. They facilitate the teachers' and students' activities, reduce the burden on students in the classroom, diversify the forms and methods of teaching, organize the learning process taking into account the student's personal features, as well as the monitor's particular learning outcomes (MATVIYEVSKAYA *et al.,* 2019). In the didactic cyberspace, it is possible to get access to a variety of learning environments, namely: receive digitized video tutorials, multimedia and hypertext links to books, texts, selected bibliographic references, website lists and virtual labs. In the virtual classroom, teachers of each subject interact with students and support their learning processes. Intellectuals are interconnected and share knowledge through forums and chats (GARITO, 2013).

Didactics is used in planning and describing the process of teaching individual lessons using ICTs. A didactic or learning scenario is an accompanying document from which it should be read as follows: the student's age (class level), subject, academic package, curriculum, description of the goal of rapid learning, methods and forms of work, teaching materials and tools, definition and content of time phases, generalization, lesson assessment (NIKOLIĆ *et al.,* 2018).

Computer literacy, media literacy, digital literacy and digital competence are concepts focused on the necessity to apply technologies in the digital age (KRUMSVIK, 2008).

Currently, the cutting-edge technologies are used in the digital age. After all, digital literacy is necessary for all aspects of human life, especially in the educational sphere (SARIPUDIN *et al.,* 2019). The investigations conducted over the past 40 years concern the influence of computer and digital technologies on the processes of upbringing and teaching, and students' learning achievements, which confirms their positive impact on various aspects of education (ZÁHOREC; HAŠKOVÁ; MUNK, 2019).

The changes brought about by technological, economic and cultural aspects at the beginning of the 21st century were very rapid and have largely affected the advanced world. Along with this, their influence has affected the developing world. The societies around the world have changed dramatically, especially regarding the availability and ease of access to digital ICTs. Therefore, in the era of rapid change, the dominant practical training within the classroom was focused on content; the teacher also directed didactic training focused on the transfer of content, and its reproduction remained the rule of pedagogy (HANS, 2013).

Literature Review.

With the advent of media technologies in the 21st century, traditional digital literacy is no longer sufficient for human survival in the framework of new media environment. More and more teachers and scholars in the sphere of computer science have studied the essence of digital literacy in education (ZHAO; KYNÄSHLAHTI; SINTONEN, 2016). Digital literacy is usually considered as a combination of technical, procedural, cognitive and emotional-social skills. For instance, the use of a computer program involves applying procedural skills (that is, processing files and editing visual images), as well as cognitive skills (that is, the ability to intuitively decipher or *read* visual messages embedded in graphical user interfaces). In the same way, data search on the Internet is considered a combination of procedural (working with search engines) and cognitive skills (evaluating data, sorting false and objective data, as well as distinguishing between relevant and unimportant data). It is believed that effective communication is accompanied by the use of certain social and emotional skills. Within the framework of growing reliance on digital work and learning environments, digital literacy has been designed as a *survival skill*, a key skill to help users effectively complete complex digital tasks (AVIRAM; ESHET-ALKALAI, 2006).

Nowadays, media education is needed for achieving digital literacy. Regardless of the purpose for which investigations and analysis are carried out, especially from an interdisciplinary point of view, it is obvious that we are undergoing a new stage in Western civilization. After the Neolithic and then the Industrial Revolution, the digital revolution leads to the third substantial stage: the information-oriented society and/or the society of communications. This leads to the emergence of a new social, political, cultural and economic order, the evolution and results of which are still unpredictable and uncertain (GALÁN, 2015).

Scientists around the world are exploring new ways to spread computer literacy among the population. Many forms go far beyond the typical class format including a variety of teaching methods and learning environments (STARCIC; TURK; ZAJC, 2015). A deeper analysis of this phenomenon will allow, in fact, estimating its impact and determining more deeply those social and cultural variables that can cause a potential gap in the use of digital media in relation to the aforementioned risks or opportunities for the development of education (CORTONI; LO PRESTI, 2018).

Pedagogical digital competence refers to knowledge, skills, attitudes and approaches to digital technologies, theory of education, subject, context and the interconnection between them (FROM, 2017).

It is beyond argument that digital competence and its various elements are important components of learning in the 21st century. The growing tendencies in the development of new technologies such as robotics, the *Internet of Things* or artificial intelligence, among many other aspects, pose new challenges, and educational institutions cannot ignore them (ESTEVE-MON; LLOPIS; ADELL-SEGURA, 2020).

Objectives of the Research

The current state of digital literacy needs to be explored. Along with this, it is necessary to seek and implement new models of learning in the education system based on the application of the cutting-edge innovative technologies and digital teaching methods. The purpose of the research lies in investigating the level of teachers' digital literacy, as well as opportunities and prospects in digital didactics for the formation of competencies as the basis of a new model for developing a learning model in the context of the digital society.

Materials and Methods

In the present research, two major methods have been used, namely: the creation of an abstract-logical model and a survey. We have taken the hypothesis of the updated model of the didactic triangle as a basis, which contains the context (as a broad concept, including curriculum, assessment, culture, etc.), proposed in Choshanov's (2013) scientific work, as well as its improved version developed by us, taking into account the synthesis of three learning environments, namely: real, virtual and neurocognitive.

The research has used data obtained as a result of an online survey on measuring the level of digital literacy of teachers and university professors in Ukraine. The number of respondents amounted 134 educators (higher education), as well as 255 teachers (general school education). Data collection was conducted through an online survey of school teachers and educators of higher educational institutions using a structured questionnaire, including closed and open questions. In order to obtain objective results, the respondents were asked not only to answer test questions, but also to estimate the proportion of teachers in educational institutions who do not work with digital technologies and do not use them in their professional activities.

The level of digital literacy of teachers as the basis for the development of competencies in the field of modern education has been investigated in the research. The proposed modification of the digital literacy development model based on the educational and didactic triangle considers the real, virtual and neurocognitive environments. The maximum statistical error of the survey results is ± 3.9% for the sample of educators of higher educational institutions and ± 4.2% for the sample of school teachers.

Results

Based on the study of the teachers' digital literacy level, as well as the opportunities and promising tendencies in the field of digital didactics in formation of competencies as the basis of a new model, a comparative assessment of the digital literacy index for certain social subgroups was carried out in order to develop a new model of education.

The digital literacy index of teachers is 87%, which is a fairly high indicator. Regarding the elements of digital literacy, the lowest value of the subindex "positive attitude to technological innovation" is 76%. This indicator measured knowledge of modern technological trends, skills in working with modern gadgets and applications, attitude to the benefits of technological innovations. It should be noted that teachers have reached the highest level in information and computer literacy—the indicators are 93% and 92%, respectively (Figure 1).

Figure 1 – Digital literacy index of teachers of secondary schools
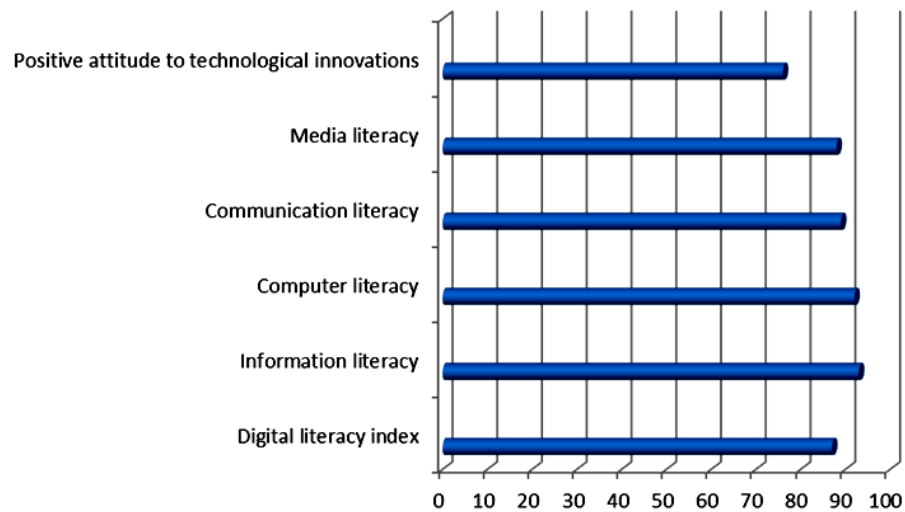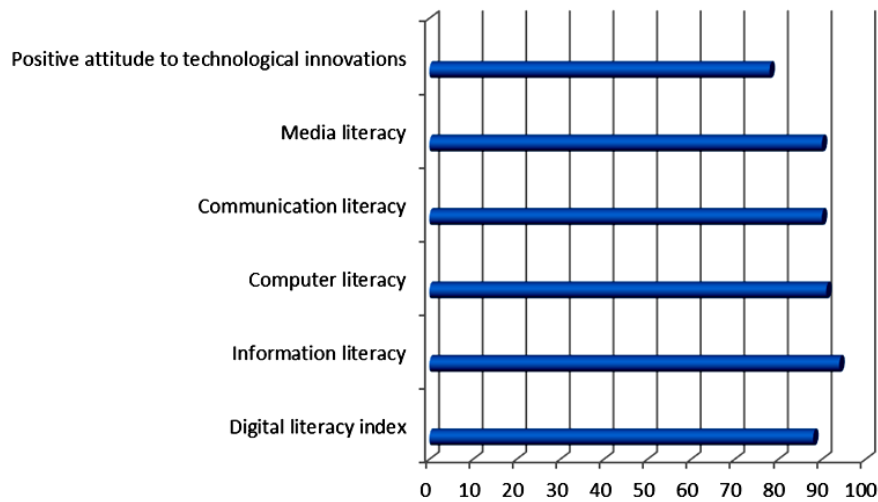

Source: Elaborated by the authors

Another aspect of measuring the digital literacy index concerned educators of higher educational institutions who also received fairly high scores. This goes to prove that the learning environment has the necessary level of knowledge and skills in the field of digital technologies. It can be stated that to work in the modern education system today is impossible without knowledge and skills in all five components of digital literacy. The digital literacy index of educators of higher educational institutions amounts 88% (Figure 2). The analysis of certain components of the digital literacy index among university professors has revealed lower indicators compared to school teachers (for example, computer literacy). At the same time, the positive attitude of university professors towards technological innovation is higher (78%).

Taking into account surveys and theoretical studies conducted, a modern model of digital literacy formation has been substantiated on the basis of a didactic learning triangle. The model is based on the synthesis of three learning environments, namely: real, virtual and neurocognitive (Figure 3).

Figure 2 – Digital literacy index of educators of higher educational institutions

Source: Elaborated by the authors

Figure 3 – Didactic triangle, the development taking into account the modification of approaches
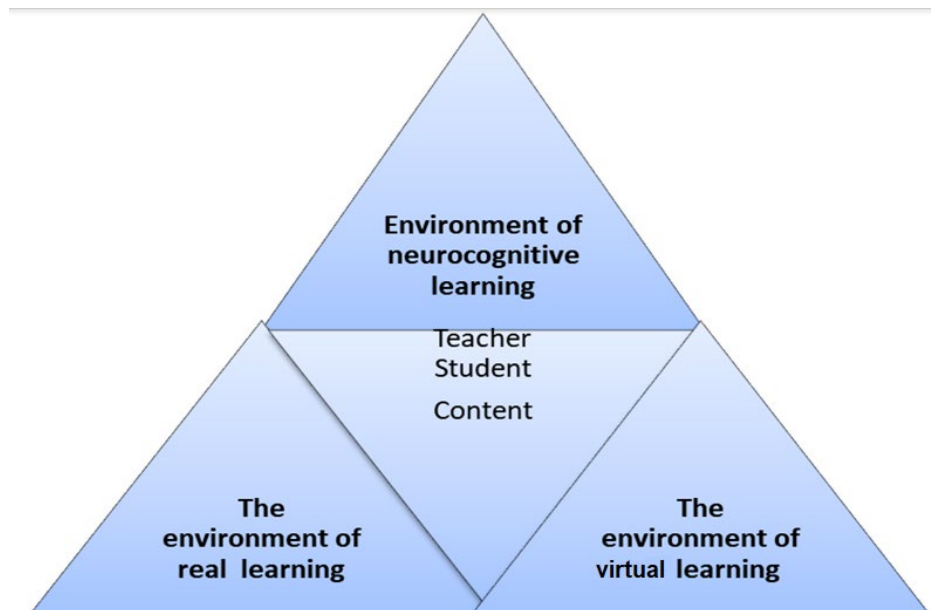
Source: Elaborated by the authors based on Choshanov (2013), Jahnke *et al*. (2014) and Klafki (1963)

The proposed approach to modeling the digital literacy development based on the didactic learning triangle in a modern environment assumes a synergistic interaction of the real and virtual environment, as well as the neurocognitive one. A real learning environment means activities at traditional secondary educational institutions and higher educational institutions. Virtual, or the so-called e-learning environment, is a new environment based on

the application of ICTs for transferring and acquiring knowledge. Neurocognitive learning environment is an activity of acquiring knowledge and skills through experience, emotions, personal contacts and other cognitive forms.

The present research is focused on revealing means for the development of competent knowledge of students in the specialty "pedagogy" for the selection and assessment of e-learning resources as an integral part of didactic-methodological teaching aids at different stages of learning and in different classes. Taking into consideration the development level of ICTs, this type of competence becomes an important element of a professional teacher and determines their achievements inside and outside the classroom as part of the overall learning process. Experience in technology and content are priority components. Reflecting and empowering different learning strategies through various e-learning resources is becoming more important. Therefore, with the advancement of technologies, in addition to access to electronic resources and content design, navigation capabilities, levels of intuitive interface and personalization, degree of integration, caution and research perspectives should focus on learning design. All this, in the context of the development of the specialists' competence in pedagogy concerning the complex examination of electronic educational resources, will provide their more purposeful and systematic use in educational process, and also their constant improvement according to the proposed learning strategy in their variety.

Classical teaching models in the form of a didactic triangle, including the content of the student, teacher and education, reflect a number of didactic principles widely used in pedagogy, which are considered as the main active element of the teacher's learning environment, implementing teaching methods. The student is to some extent inactive and may be influenced by the teacher. The relationship between the teacher and the student determines the quality of the learning process. Thus, according to the developers of e-learning systems and simulators, in order to create a sufficiently effective e-learning system, modeling the working environment, functions and logic of the teacher using technology should be applied. Such assumption, contradictory from the point of view of psychological and educational psychology, is widely discussed in the engineering and pedagogical environment and it is the basis of e-didactics—a comprehensive discipline on teaching methods in the new pedagogical reality of the technology age.

Digital literacy skills characterize the ability to localize, systematize, evaluate and analyze information using digital technologies. The Internet phenomenon promotes web multimedia learning tools including images, videos and audio files, as well as texts. A person armed with digital literacy is considered a socially responsible user of Internet and social

networks. Moreover, the traditional understanding of didactics does not meet the requirements of the information society for the rapid development of ICTs. The didactics of the digital age is becoming a science, technology and art of teaching. Didactics is a developmental field, theoretically expanding through a combination of research and learning. After all, scientists are looking for innovative solutions in order to face the challenges and respond to the complications of ICT-intensive digital learning.

In higher education, one of the most accomplished tasks is to teach people to solve global problems today and tomorrow. Accordingly, forasmuch as learning content is now freely offered and available anytime, anywhere via the Internet, traditional educational formats are considered as complex ones. The principal role of universities, in addition to investigations, lies in providing unique learning opportunities in a stimulating environment (OSSIANNILSSON, 2019). Students of higher educational institutions should develop key competencies suitable for the society armed with knowledge and information, especially in the framework of the Fourth Industrial Revolution. In a digital learning environment, where students apply learning strategies, it is important to consider that digital devices and programs will contribute to the development of core competencies. In this regard, the present research has examined the impact of digital literacy and the role of learning strategies on learners' perception of core competencies. The formation of a new information ecosystem requires a rethinking of our approach to higher education. The high-level skills needed by the society cannot be effectively developed in the framework of traditional learning models based on the reproduction of material from the teacher to the student.

Learning is a practical activity; it is an art, not just science, knowledge and skills. Digital literacy is a set of competencies that a person possesses for correcting by using digital devices in the digital age, easy access, application, evaluation, analysis and data integration, as well as the creation of new knowledge.

One of the key success factors in the development of digital literacy among the smartest generation is the active role of teachers in conducting, uniting and continuing the process of intellectual transformation, development of smart cities by using data and digital technologies in a local and global context.

Conclusions

The model of digital literacy formation was developed on the basis of didactic learning triangle taking into account the synthesis of three educational environments, namely: real, virtual and neurocognitive.

It is important to emphasize that digital competence is one of the most essential ones for teachers of the new era. This especially refers to English teachers. Learning a foreign language is a laborious process. New technologies can make it easier. The use of Internet resources, various sites, communication programs, social networks and other technologies make it possible to quickly find and assimilate information, develop creative thinking and consolidate the necessary material.

The analysis of the survey data has revealed that according to the set of compared indices for different social groups of the population, school teachers and educators of higher educational institutions have reached a high level of digital literacy. The use of research results in practice is a possible subject to the improvement of curricula, exchange of international experience and further investigations.

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