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Digital Literacy of Future Teachers in the Realities of Large-Scale Military Aggression (Ukrainian Experience)

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Abstract: The Russian aggression in Ukraine, which has been gradually unfolding since 2014, has revealed the problem of digital literacy among the population. Addressing this issue in 2022 took new forms and relevance, as the Russian regime began a full-scale war, an element of which was the distribution of huge amounts of misinformation. The article aims to analyze the Ukrainian experience of teaching digital literacy to future teachers of higher education. Realization of the goal was ensured by

using methods of analysis and synthesis, abstraction, comparison, processing of syllabuses of academic disciplines, and other documentation and practices of educational activity. The results reflect the general state of digital literacy in Ukrainian society, it was determined that the most prepared in this regard are representatives of the age group of students. Based on the consideration of methodological materials, it was found that the university educational and educational-scientific programs (primarily pedagogical) form a sufficient level of media literacy. Additionally, these effects are enhanced by the motivation of the teacher education applicants themselves and by government support. In particular, the government has offered several platforms for students to improve their digital literacy on their own, which the latter have already taken advantage of. The conclusion notes that in the future the trend of growth of digital literacy of the population will be intensive, and especially - among representatives of applicants for higher education (including pedagogical direction). The practical significance of the work lies in proving the effectiveness of distance learning, online educational platforms, and their combination with university disciplines aimed at increasing the level of digital literacy mastery.

Keywords: digital literacy, distance education, syllabuses of academic disciplines, russian aggression.

Introduction

During the professional training of specialist-teachers in higher education institutions, it should be taken into account that information and professional work in the educational sector under the current conditions of digital technology development is based on information processing. This leads to the processing of various databases on a predetermined subject area, the study of formalized information, convenient for providing a brief, but the meaningful and rich summary for students in the teaching process. Future teachers in modern institutions of higher education should have a set of knowledge, skills, and abilities, a variety of ways of activity related to the use of information and communication technologies in education, necessary for the process of adequate entry into professional responsibilities. For this reason, addressing the digital literacy of future university teachers is an urgent issue of the theory and methodology of professional education. In addition, the information culture of young people, which constitutes the digital competence of the population, has become important in the conditions of Russian aggression. The experience of using manipulative technologies in information wars demonstrates that mastering digital literacy is extremely important.

Research Problem

In the conditions of modern Ukraine and large-scale Russian aggression, acquiring the basics of working with digital information is also important not only for pedagogical reasons. We are talking about systematic counteraction to specially created and replicated fakes, actively spread by Russian information channels. Future teachers need to be able to distinguish manipulation from the truth, know how to properly check sources, and make it impossible to spread disinformation. The hybrid threats posed by the Russian Federation require a common response and response at all levels, especially in the classroom. Part of this is addressed at the secondary education stage (Hrushko, 2022), but it is higher education that is the main stage of comprehending the correct way to work on the Internet. Rajab (2018) identified the effectiveness of using digital learning in military zones. AlDahdouh (2021) explored the importance of information technology in today's education system. Bouton et al. (2021) analyzed the

impact of social media on the formation of modern student. At the same time, Edmunds et al. (2020) identified the role and impact of online courses on the formation of academic virtue. The authors of the article believe that academic virtue and the knowledge of its formation are components of digital competence. However, Fromm et al. (2021) characterized the unique capabilities of virtual reality to provide an experiential learning cycle. Mishchenko (2019) investigated the meaning of communicative competence, the main conditions, and possibilities of its formation. McGrew (2021) explored the role and importance of digital learning during the Covid-19 pandemic. In addition, Duran (2021) also investigated the impact of e-learning during the coronavirus pandemic. Yoon et al. (2021) in their case study described the specifics of using a video-based education system. European and Asian practices have also demonstrated the importance of media literacy, but at the domestic level, levels of confrontation with scammers and their schemes (Ju & Kim, 2021). Research on this topic is necessary if only from the point of view that the Ukrainian experience may prove useful in addressing similar problems in other countries. Modern Europe and America have not faced crises similar to the Ukrainian one. Therefore, the solutions adopted in Ukraine and used during martial law are highly relevant for further scholarly consideration.

Research Focus

To determine the peculiarities of training specialist-teachers in modern Ukrainian conditions there is a need to analyze additional materials. First of all, we are talking about syllabuses of academic disciplines of leading Ukrainian universities, novelties of digital tools (Internet platforms) to familiarize with the rules of the Web, sociological studies, the results of which assessed the level of familiarity of Ukrainian society with digital literacy. These problems will be considered in accordance with the modern context of the deployment of Russian aggression in the system of response challenge.

Research Aim and Research Questions

Consequently, the purpose of this article is to analyze the digital literacy of future higher education teachers in the realities of large-scale military aggression, that is, with a focus on the Ukrainian experience. At the same time, the war continues, and the new challenges of preparing future teachers need to be responded to. Accordingly, the disclosure of the main goal will contribute to the solution of the main research questions: coverage of the development of digital literacy in Ukraine in recent times (since 2019), the current view on the formation of digital literacy in modern universities in the preparation of future teachers, identifying the prospects and features of further transformations of literacy and related competencies by future teachers in the training.

Research Methodology

Since the purpose of this study was to investigate the digital competence of higher education applicants in the realities of large-scale military aggression, it was also to find out the state of students' information-critical thinking and their views on the promotion of digital literacy in universities. For these reasons, a statistical analysis of the digital literacy of young people in Ukraine, conducted by the Ministry of Digital Transformation of Ukraine, was important. To investigate the state of digital literacy of students of Ukrainian universities, a theoretical study of curricula and strategies for the development of higher education in Ukraine was implemented.

Data sampling and collection

A key aspect of the development of digital literacy is the educational and professional (educational- scientific) programs in the field of “Pedagogy of Higher Education”, which are taught at universities in Ukraine. Data collection was based on a detailed analysis of the content of syllabuses and work programs from the Ivan Franko National University of Lviv and the Grinchenko National Pedagogical University. The study was based on the analysis of such data:

1. Formation of general professional competencies.

2. Formation of competencies contributing to the emergence of skills of processing.

3. Appearance of skills in using information and communication technologies, formation of knowledge on work with computers, and information culture as a whole.

The latter category also includes knowledge of graphics programs, presentation creation and mastery of a variety of multimedia sources, and active use of information technology in education and science (See Table 1).

Table 1

Key Data from Curriculum and Syllabus Analysis

Basic data for analysis	Explanation
General professional competences	Skills, knowledge, competencies that contribute to pedagogical professionalism
Competencies that contribute to the emergence of skills in working with information	Knowledge, skills, communication, responsibility of students to search, analyze, interpret information processing.
Skills in using information and communication technologies	Formation of a high level of use of modern technologies, formation of knowledge of working with computers, mastering graphic programs, mastering various multimedia sources, application of information technologies in the system of education and science.

Source: created by the authors based on the analysis of syllabuses and curricula (Faculty of Pedagogical Education, 2022; Borys Grinchenko Kyiv University, 2020).

Data analysis

The research methods were qualitative, thematic cases, and detailed analysis in accordance with objective hermeneutics.

The results obtained were examined in terms of the goals and objectives of this study based on the principles of systematic consideration, comprehensive analysis of scholarly works of related thematic areas. The qualitative paradigm is traditionally applied in the process of thinking of participants in the

educational process. Consequently, in this case, the case study is specifically aimed at identifying the information foundations of teacher education and their advancement in the field of HE pedagogy. However, the principles of in-depth analysis adhere to the foundations of objective hermeneutics.

The methodology is aimed at developing clear answers to the formation of digital competence in the conditions of Russian armed aggression. The data obtained are theoretical in nature and may undergo changes due to objective circumstances that do not depend on the objects and subjects of training (we are talking primarily about the further deployment of the Russian offensive and the military destruction caused by it). However, the information formed still provides grounds for the formation of generalizations and forecasts of the subsequent development of educational paradigms related to digital literacy in the future.

Of particular importance is the use of general theoretical pedagogical methods of research, including analysis and synthesis. Based on abstraction it was possible to move from general concepts grounded in science to our own hypotheses and conclusions. The comparative analysis of the data obtained was important. In the work comparable sociological indicators obtained from official sources, also using this method investigated syllabuses and training programs in the direction of "Pedagogy of higher education", which are taught at universities in Ukraine. As a result of the use of axiomatic principles of the study were highlighted the value orientations of modern applicants for teacher education, further emphasizing the relevance of digital competence. Based on the predictive method, the likely future significance of digital competence for young people in Ukraine is reflected.

Research Results

The Level of Digital Literacy of Modern Ukrainians: Development Trends

The concept of "digital literacy" is a dynamic combination of skills, knowledge, and ways of thinking in the field of information, communication, and digital technologies. It influences the formation of a person's ability to successfully organize professional activities and socialize using the latest information and digital technologies. Note that this competence is also determined by the responsible application of the information in the real and digital dimensions of human activity.

Thus, digital literacy is a complex, complex phenomenon affecting human life activities in the information, globalized society. In general, digital competence consists of the following components: informational, communicative, technical, consumer (See Table 2).

Table 2

Main Components of Digital Literacy

Key components of digital literacy	
Information (media literacy)	It consists of knowledge, skills, abilities that involve search, interpretation, archiving of digital sources, comprehension, analysis of the information received, formation of information objects.

Communicative

It involves knowledge, skills, motivation, responsibility necessary for communication in different ways (chats, e-mail, social network forums, etc.).

Source: author's development.

Russian aggression in 2014 exposed the problem of Ukrainians' unpreparedness to face hybrid challenges and real information threats. Much of the disinformation was spread through the Internet and other digital channels. The government's response to the huge amount of pro-Kremlin content in 2015 was the disconnection of Russian channels from cable television packages, the removal of blatant anti-Ukrainian periodicals and books from the printed media market, which intensified propaganda, and the blocking of popular social networks VKontakte and Odnoklassniki. Some Ukrainians were skeptical of such radical steps, but time has demonstrated the correctness of the decisions made. Along with the ban on the dissemination of fake messages, the transformation of the information sphere in Ukraine was taking place, and the next step was a new rethinking of the work with digital sources of information.

In 2019, the Ministry of Digital Transformation of Ukraine released the results of a large-scale sociological study on the digital literacy of Ukrainians. It is difficult to consider the obtained figures consoling: 37.9% of the population (including interviewed residents of the already occupied territories of Donetsk and Luhansk regions, but not Crimea) aged 18-70 had digital skills at a level "below basic" (Ministry of Digital Transformation of Ukraine, 2019). Another 15.1% of respondents had no skills with modern technology at all. Already on this basis, the figure of 53% of Ukrainians who had digital skills below the basic level - in accordance with the methodology for assessing digital skills, which was used by the European Commission, became relevant. At the same time, 61.4% of young people aged 18-29 expressed a desire to learn digital literacy in the future, which was an extremely positive dynamic. Also, representatives of this age group predominantly belonged to 25.5% of people with above-average digital skills (Ministry of Digital Transformation of Ukraine, 2019). So, the global sociological study pointed to a fairly high digital literacy among students. The proposed picture can be modeled on all areas of training, in particular, future pedagogical workers (although the skills to work with modern technology in representatives of technical specialties may be higher).

Abstracting from the Russian aggression, it should be noted that digital literacy among modern Ukrainian students has also turned into the ability to perform individual or collective tasks, intensive use of resources and systems designed to evaluate data obtained from media resources, and further use them to solve tasks and obtain new knowledge. It is used to access, manage, integrate, evaluate, and generate content for further dissemination. Understanding digital literacy as a tool, a set of skills and abilities that everyone should be able to use, is important for the omniscience and self-development of potential workers around the world (Almås et al., 2021). Changes in values are also related to the rapid development of digitization of the population and distance learning, which has stimulated the exploratory interests of future educators and independent work (Duran, 2021).

In 2021, the proportion of Ukrainians with digital skills below the basic level decreased by 5.2% to 47.8% (when compared to 2019 data). the trend demonstrates the success of educational policies aimed at improving media skills. The increase in the number of students with sufficient and high levels of digital literacy also indicates a further perspective, which has been stimulated for objective reasons:

Russian aggression has further strengthened the role of criticality, responsibility, and prevalence of digital resources.

Digital Literacy in Ukrainian Universities: A Modern View

Active military operations did not interrupt the educational process in Ukraine. Although the training was transferred to the remote mode, it continued to take place. Work with the use of online technologies is flexible, so students and teachers who could leave for different parts of Ukraine or the world, fleeing the war and the Russian offensive, conducted regular classes remotely from safe places (Rajab, 2018). Additional access to modern technologies has become a significant factor in increasing the level of work with the Internet and modern information resources (Lopes & Soares, 2022). The lack of personal contact between teachers and students, online communication, independent search for information, and completion of tasks (writing essays, preparing presentations, completing projects, etc.) automatically forced personal work on the Internet (Duran, 2021). Due to this, the practice of using the resources of the Network has increased significantly - in terms of numerical indicators, qualitative transformations have begun. Distance education has demonstrated to higher education students that working with the Internet contributes to self-development, creativity, media literacy, etc.

An important aspect of digital literacy development is educational and professional (also educational and scientific) programs in the field of "Pedagogy of Higher Education", which are taught in various higher education institutions in Ukraine. The study of the content of syllabi and work programs has demonstrated the presence of a wide range of competencies that are designed to improve digital literacy. First of all, we are talking about the formation of general competencies that create the ability to search, process, and analyze information from various sources, work with the active use of information and communication technologies, and be familiar with computers and information culture in general. Accordingly, the professional competencies include the following abilities: to work with graphic programs, create presentations and master other multimedia resources of technology, ensure the implementation of pedagogical tasks (in particular at the level of programming), actively use information technology for the educational process, have knowledge of modern scientific research in the field of education, which uses modern research methods, information and innovative technologies (See Table 3).

Table 3

The System of Forming the Digital Competence of Students

Structure of digital competence formation				
Transversal competencies			Subject competences	
Promoting digital competence				
Information literacy	Ability to work with information	Communication skills	Responsible use of informative sources	Solving various educational tasks with the help of information

Empowerment of students				
Differentiation	Personalization	Availability	Inclusion	Active involvement of students

Source: author's development.

The experience of the National Pedagogical University named after Boris Grinchenko is important. Among the educational programs of the institution, which thoroughly introduces not only general but also professional competencies that form digital literacy, we should highlight the specialization “E-Learning Management” (Borys Grinchenko Kyiv University, 2020). Applicants for higher education, who will work in universities in the future, are invited to acquire the ability to navigate information flows, shape IT infrastructure in universities, plan and implement the educational process, approaching the use of the achievements of the IT sphere (Ju & Kim, 2021). In addition, the possibilities of solving the problems of educational and professional direction with the involvement of information and communication technologies, the ability to organize and manage the processes of updating information resource systems, model information flows, and set up electronic document management were also discussed (Kelly, 2021).

At Ivan Franko National University in Lviv, at the Faculty of Pedagogical Education, the course “Fundamentals of Media Literacy” (Faculty of Pedagogical Education, 2022) attracts attention. Its goal is to explain the mechanisms of functioning of public opinion about the essence of phenomena, reality, concepts, and ideas. During the training, future teachers work through individual cases of fake news that are found on the pages of print media, audio and video stories, etc. A detailed theoretical part forms an effective mechanism for critical understanding and filtering of information messages coming from manipulators, work on personal information hygiene and creation of systems of value orientations, ability to interpret information, etc. Specialists from the Ivan Franko National University of Lviv also conduct additional classes for schoolchildren, organized not only by students of pedagogical direction. For example, the “Young Diplomat Summer School” takes place annually at the Faculty of International Relations. In addition to researching the history of Ukrainian diplomacy, all participants listen to lectures and attend practical lessons on digital literacy, in particular, a certain collection of rules of the careful use of social networks is prepared for students. Educational work aroused interest among the audience because the theoretical material was qualitatively supplemented by communication in foreign languages, work with Internet materials, in particular the practical basics of media literacy, and the formation of information hygiene. The use of such platforms is extremely useful, because students, future university teachers, had an additional opportunity to practice pedagogical work related to the use of digital technologies and to acquire the necessary skills in working with it (Kelly, 2021). Note that the special role of digital literacy was highlighted after 2014 when the Russian occupation of Crimea and aggression in Donbas demonstrated the vulnerability of Ukrainian society to information attacks (Hrushko, 2022). We believe that the digital literacy of higher education applicants is also shaped by online conferences, in which students from different universities participate. In particular, the experience of the international scientific and practical conference “The Phenomenon of Europe”, which has been repeatedly organized at Lviv National University, is important; the remote holding of the conference demonstrated the success of using distance technologies and the impact on the formation of digital competence in the participants of such educational events.

The state policy aimed at overcoming cyber threats on the Internet is important. As noted, an unprecedented amount of false information, fake content, and manipulation has become a satellite of open Russian aggression. Streams of such messages were aimed at the mentality of Ukrainians to demoralize and psychologically break, discredit the army and power institutions. To counteract this influence, the Internet platform "Action. Digital Education", the goal was to form and improve the digital literacy of the population. Changes in the organizational structure of the site "Action", easy surfing, improved algorithms for finding the necessary information, and some other improvements were brought to the attention of users. The use of the platform is free, which makes it possible to reach the widest strata of the population (Ministry of Digital Transformation of Ukraine, 2019). Particular emphasis is placed on educational series - this format is better perceived by the audience. The portal presents educational series on digital literacy for various categories and professions: lawyers, teachers, medics, media workers, civil servants, students, etc. This system of learning allows for learning and development even amid warfare.

The system "Diia. Digital Education system" allows you to pass the final exam (in the form of testing) using the National Online Digital Literacy Platform. The exam is freely integrated with any other courses that are taught remotely (and not only remotely) at Ukrainian universities. For example, future teachers from the Poltava V.G. Korolenko National Pedagogical University had the opportunity to get acquainted with the discipline "Digitalization of the Educational Process", which aimed to develop their skills and abilities to work with digital technologies for the organization and administration of the educational process, ensuring the development of the basis of information culture and digital literacy. At the end of the training, an exam was held on the National Online Digital Literacy Platform. We believe that such integration of state platforms makes it possible to diversify training, develops a system of distance learning in the realities of large-scale military aggression.

Therefore, modern university education offers a set of disciplines that aim to form digital literacy and other competencies related to modern work on the Internet (Fromm et al., 2021). The introduction of so many materials into the educational process is related to the Russian aggression in Crimea and eastern Ukraine in 2014 when the Kremlin regime and its controlled information channels did not find a proper response. A novelty of the teacher training was the possibility of close integration of state educational platforms with university courses, as well as a special emphasis on theoretical and practical classes on information hygiene and countering disinformation.

Discussion

The importance of digital literacy of the population has been rightly emphasized in the studies of American and European scientists. At the same time, the Ukrainian experience allows us to look at this problem from a slightly different perspective. Researchers had not previously assumed the possibility of an open and prolonged war within Europe, where the last bloody conflict accompanied the fall of united Yugoslavia during the 1990s. For this reason, the events taking place on the territory of Ukraine are of great importance not only on the military side (drone warfare and other new military technologies) but also in the socio-humanitarian sphere. Countering hybrid challenges and information security of the state turned out to be as important an element of protection as, for example, the air defense system.

The possibilities of distance learning are well known. In particular, Conte et al. (2019) outlined the potential opportunities for using this form of educational work in the context of active use of digital

technologies. Similarly, Rajab (2018) noted the effectiveness of online learning in times of armed conflict, identifying among the advantages that modern means of communication allow for the successful delivery of classes to student and faculty communities dispersed as a result of armed conflict. Without denying the conclusions of our colleagues, we would like to add: distance learning is effective even in conditions of open hostilities. In addition, as it has been established, it has a certain psychological effect: the appeal to educational activities calms the audience, returning it to a more normal emotional state. At the same time, working with the Internet required additional digital literacy.

The processes of digitalization in Ukrainian society have made it possible to establish a generally permanent work of educational institutions. Integration of state support for digital literacy and courses taught in higher education institutions will improve the situation in this important area. The armed aggression of the Russian regime has acted as an additional motivation - many young people do not want to get "hooked" by Russian propaganda (this is evident from sociological surveys). Students of pedagogical specialties are among this category of citizens, and in the future, the trend of their interest in digital literacy will only grow. Therefore, the creation of new disciplines that aim to form digital literacy among future teachers is a relevant process - the growth of such educational (educational and scientific) programs has become a kind of response to the hybrid challenges posed by Russian propaganda. Media education is also a relevant area, which influences the formation of digital and media literacy.

Conclusions and Implications

Thus, increasing the level of digital literacy among the Ukrainian population has become a response to open military and hybrid threats from the Kremlin authoritarian regime. In practice, fakes and disinformation are best monitored by representatives of the student age group, including representatives of pedagogical specialties. Among the reasons for this situation is the focus of state policy aimed at increasing the methods of countering cyber-attacks. Additional courses and opportunities to identify and overcome hybrid threats, special trainings, etc. were offered. This system is well integrated with the work of universities, especially pedagogical departments that train future teachers of higher education institutions. Theoretical and practical study of media will allow students to understand the manipulative component of modern media. However, currently, there are few disciplines with a component of media education in Ukrainian universities. Therefore, it is important to introduce a wide range of media education disciplines for different specialties.

The analysis of curricula and syllabi from several Ukrainian universities made it possible to establish a high level of knowledge that will be required from applicants for higher education. For this reason, further training in digital literacy will ensure an adequate level of media competence to work not only in distance learning mode (caused by martial law) but also to counter and detect hybrid threats.

Further unification of state platforms for digital literacy training and university pedagogical courses looks like a reliable prospect for countering Russian media policy. At the same time, this issue will still require further research in view of the new methods of information warfare offered by the Kremlin regime.

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