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Impact of school lockdown on access to online instruction during the war in Ukraine

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Abstract

Quarantine measures in connection to the COVID-19 pandemic challenged the education system in Ukraine, like the education systems of other countries. This manifested over the course of three years in an increased need to develop distance learning online. Also, teacher ability to use digital tools, such as information communication technology (ICT), for instruction online is crucial in wartime circumstances in Ukraine. We describe the effects of school lockdown on teachers in Ukraine and how this affected teacher abilities to use distance instruction online in wartime circumstances. Drawing on a large-scale survey of 54,254 educators conducted in January–February 2022, we report on challenges and needs identified by teachers in Ukraine. The survey collected responses from teachers and other categories of educators. Our analysis of survey findings focus on key challenges and needs of teachers and schools during the COVID-19 quarantine. Respondents identified the following challenges: (1) lacking access to ICT equipment; (2) lacking access to stable high-speed internet; (3) an insufficient level of knowledge and skills in using ICTs (*digital competence*). The study on which this article reports outlined possibilities for the professional development of teachers in Ukraine, complemented with a teacher self-assessment of digital competence. The findings demonstrate that methods for organising online education in wartime circumstances in Ukraine benefit from the active interaction of all participants in the education process,

their adaptability to changing learning conditions, continued communication about needs, notably teacher abilities to use ICT, and the ICT capacity of institutions.

1 | INTRODUCTION

The World Health Organisation announced the spread of COVID-19 a public health emergency of international concern on 30 January, 2020 (WHO, 2020). This was followed in March 2020 by the declaration of a global pandemic. The WHO called for every country to take bold actions to stop the spread of COVID-19. Changes in education caused by the COVID-19 pandemic contributed to a global crisis in education in 2019–2022. In most countries, general secondary education institutions locked down and developed strategies to overcome the challenges of the pandemic by switching to online instruction. International organisations conducted various studies of the state of education during the quarantine period. Assessment results from a joint study by UNESCO, UNICEF and the World Bank (UNESCO, UNICEF, & World Bank, 2021) on student knowledge and competences by the end of 2021 demonstrate significant gaps in mathematics and reading in most countries. The outcomes of students among the most marginalised strata of populations were disproportionately affected. The issue of unequal access to equipment for online learning during quarantine has been addressed in the education community in recent years (Duroisin et al., 2021).

As was noted by the OECD Director for Education and Skills, and Special Advisor on Education, by 16 March, 2020, about half of the 33 OECD countries in the world with comparable data had fully closed at least some primary and secondary schools (Schleicher, 2021). On average across OECD countries with comparable data, pre-primary schools were fully closed for an average of 42 days in 2020, while primary schools closed for 54 days, lower secondary for 63 days and upper secondary schools for 67 days (OECD, 2020).

Ukraine, like other countries, suffered significant losses in terms of the quality of the provision of education services during the COVID-19 pandemic. This prompted a study of the current state of education services, a search for ways to overcome gaps in education, and the identification and implementation of effective steps to solve current problems. In 2020, the government of Ukraine adopted a resolution in March, followed by an order in September, which outline the main strategy for education in schools (MoES, 2020a, 2020b). According to these regulations, schools and other education institutions should create conditions for online instruction. The documents regulated that the decision to instruct either using a synchronous or asynchronous mode was up to the teacher of individual classes. At the same time, we observe that instruction at schools in Ukraine was for at least 30 percent of study time organised in synchronous mode (the rest in asynchronous mode). To ensure the working conditions necessary for the organisation of distance learning, a decision was made that personal laptops should be provided for teachers. In 2021, most schools in Ukraine reopened schools as the number of COVID-19 cases decreased in the country. In 2022, teaching in the majority of schools was carried out in-person, in primary grades and partially at middle and high schools.

In 2022 the situation in Ukraine was complicated by Russia's full-scale military invasion on 24 February, 2022. The invasion resulted in a significant loss of school infrastructure and human resources. Considering the peculiarities and difficulties of organising wartime education, the government in Ukraine made recommendations and guidelines for instruction in 2022–2023 (MoES, 2022). The invasion resulted in a loss of territory, destruction of school infrastructure, shelling and bombing of large cities, towns and villages. These dangerous

circumstances forced a halt in education, and a return to distance learning. Many students and teachers became displaced persons and refugees as they were forced to leave their homes and Ukraine. These circumstances outline the clear need for teachers in Ukraine to use online instruction to reach students. Recent studies conducted by international organisations about Ukrainian refugees in other countries have shown the existence of problems and challenges with ensuring the right to education (Norwegian Refugee Council, 2022; UNHCR, 2022). In wartime conditions, since September 2022, the MoES of Ukraine reports that 12,906 schools have been operating. Of these schools, a total of 3115 used in-person instruction, 5339 provided instruction online, and 4444 instructed using a combination of in person and online instruction. Moreover, 492,077 school-age children and 26,000 teachers are abroad (Shkarlet, 2022). Issues of online instruction and teacher access to digital tools such as ICT equipment have been thoroughly studied since the beginning of the pandemic in Ukraine. This article presents our analysis of the impact of the lockdown that preceded the war, on the access to distance teaching in wartime Ukraine. To this end, we have carried out a secondary analysis of the results of the all-Ukrainian survey of teachers, which was conducted in January and February 2022. We used the survey to identify challenges, needs, and the level of teacher digital competence for carrying out online instruction. The findings have allowed us to draw parallels and provide recommendations to decision-makers in Ukraine. Surveys on the state of distance learning in schools in Ukraine were also conducted in previous years (2020, 2021, 2022). This has made it possible to compare the results obtained over three years and outline unresolved problems and certain trends regarding progress in these issues (Chepurko & Gladchenko, 2021; Ivaniuk & Ovcharuk, 2021).

2 | METHODS

The survey was carried out from January to February 2022, by the Institute for Digitalisation of Education of the National Academy of Educational Sciences of Ukraine. The tool used for conducting the survey was the online survey software Google Forms. The survey was distributed among schools and teachers via social media. It was also distributed on email lists by education institutions and in-service teacher training centres. The purpose of the survey was to support distance education capacity in Ukraine through a teacher self-assessment of digital competence; also, by identifying teacher ICT readiness and needs. The survey comprised 38 questions grouped in four thematic parts: (1) general information about the respondents, (2) *organisation of distance learning in practice*, (3) identification of *teacher needs* pertaining to the provision of distance teaching, including in-service training, during the quarantine, and (4) a *self-assessment* of digital competence. The general information part of the survey addressed the socio-demographic background of participants (age, gender, institutional location), information about their experience (qualification, years of experience, subject). The part on the *organisation of distance learning in practice* sought to chart the digital tools and online resources that teachers use, what kind of difficulties and obstacles teachers experienced, where they stored information and how they organise online instruction. The part on *teacher needs* surveyed where teachers got information about new ICTs during the COVID-19 pandemic, what in-service training on ICTs is offered by institutions, and concrete needs identified by teachers. The *self-assessment* part surveyed teacher perceptions on digital competence. The survey contained closed questions for teacher responses. The novelty of the survey is in the way that categories for digital competence were selected in line with international approaches.

3 | RESULTS FROM THE 2022 ONLINE SURVEY

3.1 | Challenges to distance teaching for teachers and schools in Ukraine

A total of 54,254 education professionals in Ukraine took part in the 2022 survey. The surveyed categories of professionals included teachers, school administrators and school heads, methodologists at in-service training

institutions, and psychologists at education institutions (Ovcharuk & Ivaniuk, 2022b). Among those surveyed, the numerically largest category represented were primary school teachers (23.9%), followed by foreign language teachers (10.7%), teachers of Ukrainian language and literature (10.5%), mathematics teachers (9.1%), and school administrators (9.1%). The geographical distribution of respondents was 47.7% from cities; 43% from villages; 9.3% from urban-type settlements.

The following digital tools, or ICT applications, for organising online instruction were identified as the most popular in the survey: Viber (78.4%); Zoom (65.4%); the website of the education institution (23.5%); Google Apps for Education (20.2%); My Class (19.5%); Electronic diary (15.4%); e-platform of the educational institution (14.3%); Telegram (13.3%); Jitsi Meet (13.1%); Padlet (11%); Flipped Classroom (10.9%); Skype (8.3%); Microsoft Teams (4.7%); WhatsApp (3.3%); Moodle (3.2%); ClassDojo (1.5%); Tik-Tok (1.4%). Comparing results for 2020, 2021 and 2022 on the use of digital tools for online instruction, we found that Viber, Zoom and the website of the education institution remain the most popular among teachers (Figure 1).

Survey responses showed that the resources and platforms for online instruction that teachers used most frequently were: Na Urok (84.7%); YouTube videos (73.1%); Vseosvita (71%); All-Ukrainian online school (41.6%); EdEra (29%); social media, including Facebook and Instagram (24.5%); the website Learning.ua (21.4%); Prometheus (16.6%); Blogs, including online magazines, event diaries (11.7%); Kahoot (9.9%); Digital Education *Diya* (8.5%); Classtime (7.8%); video lessons on TV Channel *Kyiv* and local TV channels (6.5%); Edpuzzle (1.4%); TED-talk videos
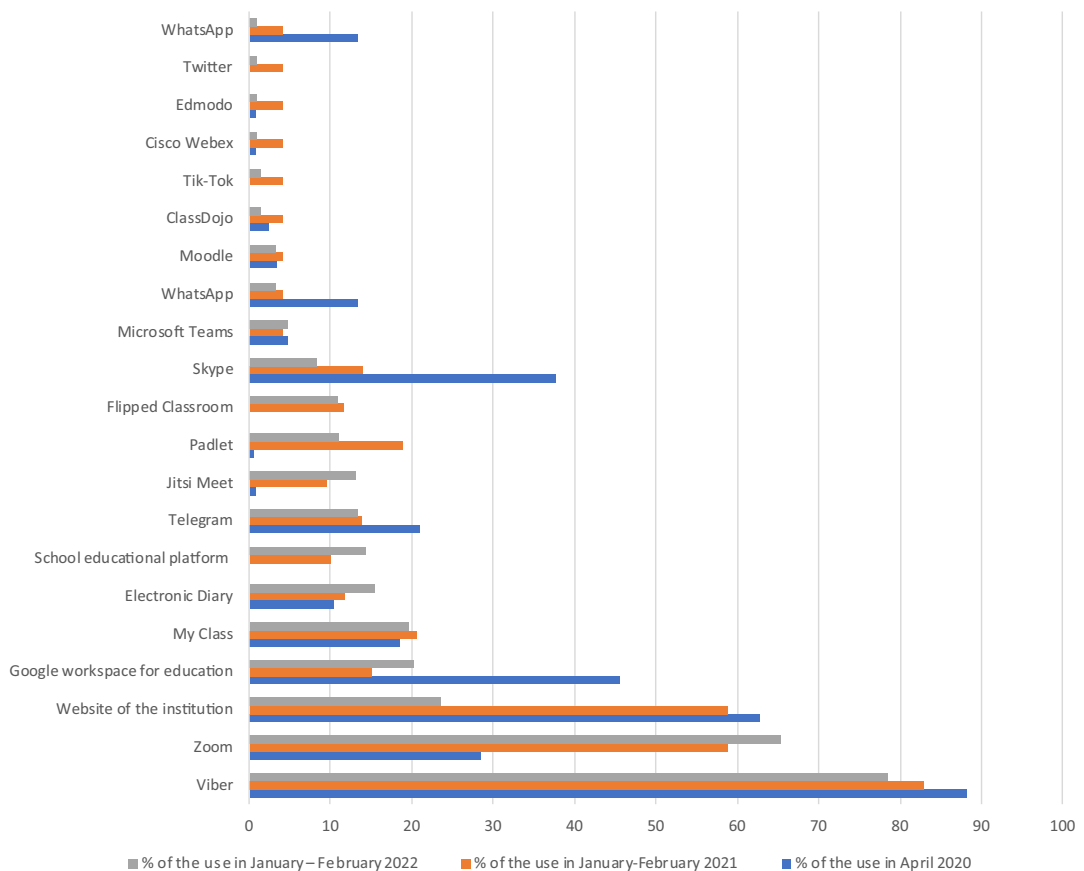

FIGURE 1 Use of digital tools for distance learning. Educator responses in 2020, 2021 and 2022, Ukraine. *Source*: Figure constructed by authors using data from Ovcharuk and Ivaniuk (Ovcharuk & Ivaniuk, 2022a, 2022b).
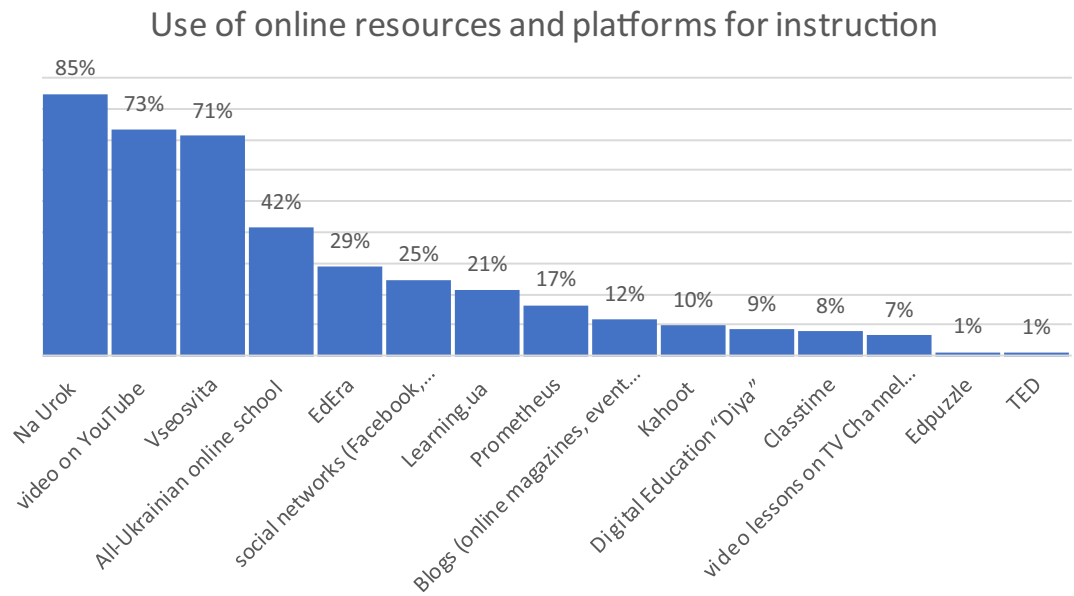
Use of online resources and platforms for instruction

FIGURE 2 Use of online resources and platforms for instruction. Educator responses in 2022, Ukraine. *Source*: Figure constructed by authors using data from Ovcharuk and Ivaniuk (2022b).

(1.1%). Fewer than 1% of respondents indicated they could create their own instruction materials online, which indicates that teachers need support to develop knowledge and skills for creating resources for online instruction (Figure 2).

During the survey, the respondents also identified a number of problems and needs that we have been monitoring for three years in a row: 2020, 2021 and 2022. A comparison of responses shows that some of the main problems faced by pedagogues during the organisation and implementation of distance learning in 2020 had been resolved by 2021. Problems that remain unresolved, include the following: insufficient material and technical support to students; lack of stable high-speed internet; low levels of self-organisation and motivation among students; insufficient material and technical support to education institutions; lack of time due to increased workloads for teachers; a decrease in the quality of educational services; and a continued need to strengthen the digital competence of teachers. New problems identified in 2021 related to difficulties in the organisation of distance teaching in primary schools; psychological problems, both of teachers and students; a decrease in the quality of education services; and a lack of support from parents for the organisation of distance education.

Teachers noted an overall decline in student performance during the quarantine period. These trends are confirmed by other studies conducted in Ukraine. A study by the State Education Quality Service of Ukraine, investigated the quality of the organisation of distance learning in general secondary education institutions (State Education Quality Service of Ukraine, 2022). It testified that extended periods of distance learning in schools affected the results of student learning in different subjects, including mathematics and the learning of new languages. A total of 595 primary school teachers were interviewed for the study; 1,298 teachers from lower and upper secondary schools were also interviewed; also, 52 heads of educational institutions. The *lack of live communication* was identified by more than 73% of respondents as a factor that affected student learning negatively. Other factors that were reported to affect student learning negatively included *insufficient equipment*, a *lack of high-speed internet*, and a *lack of appropriate skills for working with distance learning technologies* (State Education Quality Service of Ukraine, 2022).

In 2022, the most frequently noted needs for professional development were: *new methods of conducting on-line lessons* (45% of respondents); *creating an educational video, recording and editing video lessons* (33.6%); *new on-line tools and services for the development of student creativity* (30.6%); *practical advice in mastering new digital tools* (26.6%); *assessment tools and methods in distance learning* (25.8%); *new primary school classes on the 'New Ukrainian School' (NUS) platform* (23.4%); *new online seminars, workshops on school subjects* (22.2%); *quick online consultations on the use of IT* (16.5%); and *creating and maintaining blogs* (11.3%; Ovcharuk & Ivaniuk, 2022b).

A goal of the survey was to chart the ability of teachers to create and use their own online resources. To the question "*Do you have an e-portfolio where you store your achievements, methodical materials, educational resources, etc.?*" more than half of respondents (51.4%) answered that they do not have an e-portfolio, 42.4% of teachers responded that they had one, and only 9.1% of respondents had created and maintained their own blog. The per-centage of educators creating their portfolios increased by approximately 3% in 2022, compared to 2021.

The survey sought to determine where teachers obtained news about new distance courses for professional development; which online forms of professional development they considered the most effective; and which organisations provided professional development for teachers on the use of ICTs. It was found that teachers mostly followed news about online courses on the use of ICTs through: newsletters from the administration of the educational institution (72.5%); the website of the MoES (57%); websites of in-service teacher training institutes (55.5%); social networks (55.1%); teachers' blogs (22%); and websites of public or business organisations (5.4%). Pedagogues consider the following to be effective forms of professional development online: *online master classes* (27.8%); *massive open online courses* (26.5%); *webinars* (20.2%); *online conferences and seminars* (15.5%); *online professional competitions* (7.3%); and *online projects* (1.9%).

Today, it is important to respond quickly and flexibly to teachers' needs for professional development. Programmes on the use of teacher online resources for distance learning should be diversified. Teachers should be offered timely consultations on these issues. Today, there is a greater range of professional training choices for teachers. This is a positive development and a point of interest for those who make policies for the continued professional development for teachers. This is important, because teachers make choices about the institution at which they engage with professional development, and the form of professional development they engage with. Survey respondents identified organisations conducting teacher professional development in Ukraine. These in-clude regional institutes of postgraduate pedagogical education (90%); other educational institutions (university, institute, college, school, 28.7%); NGOs (8.3%); international organisations (5.9%); commercial companies (5.4%); and other providers (2.7%).

The professional development institutions that were the most frequently consulted by teachers, according to the results of our survey, have partially updated their teacher education programmes during 2022 and 2023. These organisations offer a series of courses that teachers can take online; for example, courses on the follow-ing topics: Computer science teachers' use of ICT for ensuring quality teaching in specific subject matter areas outlined in the New Ukrainian School reform; using the Edpuzzle application for *Flipped learning* (Vseosvita por-tal, 2023). The popular platform *Na Urok* offers teacher training on such topics as the use of internet resources for constructing lessons; means and resources for communicating with students, parents and colleagues; current uses of online technologies; Artificial Intelligence; using mind maps in instruction; ethics of face-to-face and distance learning; and the use of social media in online teaching (Na Urok, 2023).

4 | ANALYSIS OF RESULTS IN LIGHT OF THE DIGITAL COMPETENCE FRAMEWORK FOR CITIZENS

The international community discusses the importance of identifying teacher digital competence levels in cur-rent education approaches and international framework documents. European standards have been used in

research as a lens to study contemporary professional competence development issues for teachers (Caena & Vuorikari, 2021).

A central goal of the 2022 survey was to self-assess the digital competence of teachers. Survey questions aligned with European reference frameworks, in particular the *DigComp 2.0* digital competence framework for citizens (Vuorikari et al., 2016). The questions aligned also with the *DigComp 2.1* framework with eight proficiency levels and examples of use—including the basic user, independent user, and professional user levels (Carretero Gomez et al., 2017). The *DigComp* frameworks outline five areas of digital competence: (1) information and digital literacy, (2) communication and collaboration, (3) digital content creation, (4) security, and (5) problem solving. Educator self-evaluations in this study were based on these areas and levels.

For the topic *information and digital literacy*, 21% of respondents confirmed their ability to search for information on the internet using a search engine at the basic level; 48.1% of respondents noted that they can use various search engines as independent users; 30.9% of respondents indicated that they have professional level skills for using advanced search strategies to find reliable information online. To questions about the ability to assess the reliability of information during a search 30.3% of respondents noted that they know that not all information online is reliable—this corresponds with basic level users. Of respondents, a total of 24.9% indicated that they use some filters when conducting searches to compare and assess the reliability of the information they find—this corresponds with independent level users. A total of 44.8% of respondents noted that they can assess the reliability of information using a number of criteria—this corresponds with the level of professional users. Meanwhile, 25.9% of respondents stated that they had basic level skills for saving and restoring files and content; 32.2% of respondents classified information, created backup copies and stored it at the level of an independent user, and 41.8% knew how to save information in various formats, as well as use cloud services at a professional user level.

On the topic of *communication and cooperation*, when asked about the ability to communicate using various means of communication, 24.9% of respondents indicated that they had basic level skills for using Skype or basic chat functions (voice messages, SMS, text exchange). Skills in independently using advanced functions for communication, including Skype and sharing files, were reported by 13.4% of respondents. Professional skills in actively using email, chat, SMS, instant messaging, blogs, micro-blogs, and social media for online communication was reported by 61.7% of respondents. When asked about the ability to use online services for interacting with banks, healthcare and government, basic level skills were reported by 24% of respondents. Confident independent use of online services was reported by 37.1% of respondents. Professional and active use of online services was reported by 38.9% of respondents.

On the topic of *creating digital content*, educators were asked about their ability to create multimedia content in various formats using a variety of digital tools and environments. Basic level skills for creating simple digital content in the form of text, tables, images, and audio files in at least one format, using digital tools, were reported by 62.9% of respondents.

Confidence in independently creating complex digital content such as text, tables, images and audio files, as well as using tools to create web pages or blogs was reported by 32.4% of respondents. Professional level ability to produce complex multimedia content in various formats using a variety of digital tools and environments, such as creating a website using a programming language, was reported by 4.7% of respondents. Respondents were also asked about their knowledge of rules and regulations for using content in accordance with copyright protection. A basic level of knowledge—that is, knowing that content can be protected by copyright—was reported by 46.9% of respondents. Confidence in independently knowing how to refer to and use copyrighted content was reported by 39.6% of respondents. Professional level knowledge of how and when to apply licences and copyrights was reported by 13.4% of respondents. When asked about programming skills, 72.9% of respondents reported basic level skills; that is, the ability to change simple functions in software by changing the default parameters. An independent user level of skills, as defined by awareness of the basic principles of one programming language, was reported by 21.3% of respondents. Professional level skills in programming—defined as the ability to use several
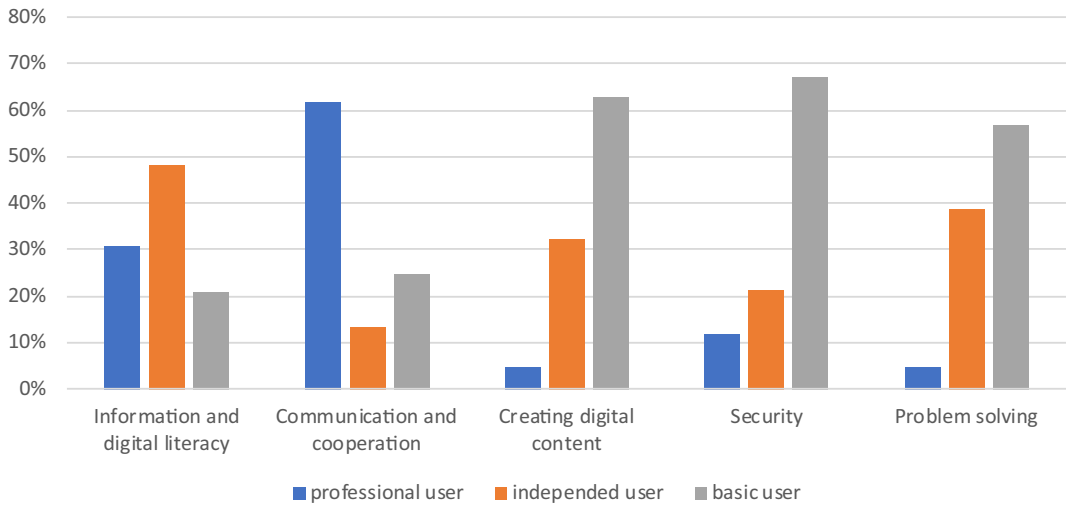
Self-evaluation of educator digital competence

FIGURE 3 Self-evaluation of educator digital competence. *Source*: Authors.

programming languages, and know how to design, create and modify databases with the help of software—was reported by 5.7% of respondents.

On the topic of *security* respondents were asked about their ability to protect systems of devices and applications. Basic skills, such as using antiviruses and passwords, were reported by 67.3% of respondents. An independent user level of skills, defined as the ability to instal security software on devices used for accessing the internet, such as an antivirus program and a firewall, were reported by 21.1% of respondents. Professional level skills, defined as frequently checking the security and system configuration of devices and/or applications used to access the internet, were reported by 11.7% of respondents.

Respondents were asked about their ability to use ICTs safely for their own health. Basic knowledge of this topic, defined as knowing that the use of digital technologies affects their health too much, was reported by 20.7% of respondents. Independent user skills, defined as an understanding of the health risks associated with the use of digital technologies, such as the risk of addiction, were reported by 30.4% of respondents. Professional level skills, defined as the ability to use ICTs in a way that physical and psychological health problems are avoided was reported by 48.9% of respondents. On the topic of *problem solving*, respondents were asked about their ability to solve problems that arise when using digital technologies. Basic level skills, the ability to find support when a technical problem occurs or when a new program is used, was reported by 56.7% of respondents. Independent user skills, defined as an ability to solve problems that most often arise when using digital technologies, was reported by 38.8% of respondents. Professional level skills, defined as the ability to solve almost all problems that arise when using digital technologies, was reported by 4.5% of respondents. An overview of findings from the digital competence survey is presented in Figure 3.

5 | ANALYSIS OF THE RESULTS OF THE TEACHER SELF-ASSESSMENT

In this section, we analyse findings from the self-assessment of teacher digital competence, and we discuss what we identify as key take-aways, or lessons learned. Soon after transitioning away from COVID-19 quarantine and school lockdowns, the circumstances changed in 2022 to a wartime context in Ukraine. Teachers had to learn how to use

digital tools independently, as well as find and process information to prepare materials for lessons. Teachers have had to work in demanding circumstances, including very harsh circumstances in shelters and while experiencing diverse threats caused by the war. Teachers have made significant efforts to master distance learning tools on their own.

The educator self-assessment of digital literacy and competence in this survey demonstrated that most teachers are able to search for information online, assess the reliability of information, and save the information found. The vast majority of respondents know how to communicate using a variety of applications and platforms, create and manage content, use online services, know how to use online tools for collaboration, and how to create multimedia content in various formats. We observe positive developments on the topics of *information and digital literacy* as well as *communication and cooperation*, where teachers demonstrated an independent and professional level. However, about 28% of teachers still need advanced training on these issues. When asked about digital competence, teachers reported a lack of confidence (basic level skills only) in the areas of *digital content creation*, *safety*, and *problem solving*. We do not consider teachers of computer science and related subjects where digital competence is their speciality. Nevertheless, teachers are limited in their use of ICTs, and the continued development of teacher digital competence should be increased. Teachers in Ukraine do not actively create their own digital resources. Teachers reported a passive stance for most measures on the safe use of digital resources. They did not have enough skills to protect devices and personal information.

ICTs have been introduced to education in Ukraine with some success. However, there remains issues to be resolved. There is a need for further research and methodological guidelines on how to use ICTs in education. Also, there is a need to increase the capacity, and to maintain the readiness, of teachers to use ICTs. An advantage is that teachers actively respond to inquiries about problems. Education institutions have shown a readiness for implementing distance learning, expressing their expectations and identifying existing problems. Among the main problems, respondents include the weak provision of, or lack of: digital devices, high-speed internet, and information technology infrastructure management at education institutions. Respondents to the online questionnaire in this survey noted that the implementation and use of digital tools in general secondary education in Ukraine is not effective enough.

Our analysis of the 2022 survey has focused on finding out how teachers and schools need to respond to the challenges of wartime circumstances, based of what we know from the experiences and knowledge gained from online instruction in Ukraine during the COVID-19 quarantine. We considered the fact that teachers are gradually mastering new digital technologies for the implementation of distance learning in educational institutions. In addition, our analysis considered new requirements for the implementation of educational activities that appeared during the long quarantine period. During the quarantine, schools and other educational institutions developed new strategies and work plans for distance teaching. A number of methodological guidelines and resources were made available to support educators in distance instruction in Ukraine. Courses on the use of digital learning tools in classroom instruction have been developed within the framework of advanced post-graduate courses—that is, courses for continued professional teacher training in Ukraine. In 2020, in response to the need to conduct school education remotely, a number of methodological recommendations were prepared for teachers in Ukraine; these included a publication titled "*Organisation of distance education at school. Methodical recommendations*", which has served a resource for teachers also in wartime (Lototska & Pasichnyk, 2020).

Three points stand out in the results of the survey that we analyse in this article. First, that teachers reported a need to master new and effective ICT tools for the organisation of distance learning. Second, teachers have changed their attitude to online resources for distance learning provided by various institutions, they need quality materials accompanied by clear methodical advice. Third, teachers in Ukraine have begun to exchange distance teaching experiences more often, they communicate more in professional communities. This has helped to increase their competence in communicating through digital means.

It should be noted that the process of self-assessment of digital competence by teachers encourages teachers to develop their skills further, as self-assessment helps to identify topics and areas for further training. This was demonstrated by teacher reflections provided in response to an open question in the survey for suggestions for

further education. We recommend that similar teacher self-assessment surveys be regularly conducted, and that topics for professional development are proposed based of these surveys.

6 | RECOMMENDATIONS FOR HOW TO RESPOND TO TEACHER ICT NEEDS

The purpose of the survey on which we report in this article was to find out the readiness and attitude of educators and teachers to the organisation of distance learning in Ukrainian schools. A goal was also to find out their opinions about the most effective digital tools and to identify problems in the implementation of distance learning.

The results of the survey showed that at the beginning of the war, a significant part of teachers needed support for using tools for distance instruction. The unexpected period of partial isolation of teachers and schools in Ukraine during the COVID-19 pandemic was continued during the war that followed, and it may be extended indefinitely. Meanwhile, any support that can be provided to teachers is useful and important for minimising the loss of time and to support the achievements made by teachers and students during school lockdowns. We identify several commonalities in the organisation of distance learning during the quarantine and during wartime. On this background we list the following recommendations for policymakers and practitioners in education:

- Develop a format and plans for regular communication with teachers to solve problems and quickly respond to the needs of teachers, to provide support for improving and updating methods for online teaching.
- Create conditions for providing teachers access to high-speed internet and computer equipment for distance learning.
- Develop clear instructions for all categories of teachers, school psychologists, social pedagogues, teacher assistants, and school heads regarding the use of online tools for conducting distance learning and establishing communication channels between education institutions.
- Make changes to staff and school personnel schedules to allocate time for an ICT specialist for technical support, to ensure distance learning.
- Create and implement short-term courses at vocational education and training (VET) institutions and other institutions that conduct teacher training, in each region of Ukraine. Specifically, courses on the use of tools for online instruction, and the development of digital competence of teachers in accordance with the Digital Competence Framework for Educators (DigCompEdu; Redecker, 2017). In Ukraine, educators have identified as effective forms of professional development notably webinars, online courses and master classes, online conferences, online seminars and projects.
- Expand the range of TV and radio lessons for students on regional mass media channels.
- Introduce a system of online counselling on the use of ICTs and conducting distance learning at each institution, for teachers in wartime conditions. Such counselling should also be organised for parents at the school level.
- Provide more opportunities to teachers for exchanging experiences about online instruction (at education institutions, professional communities and schools).
- Develop reminders for students and parents on the safe use of screen time and online tools, to protect against online threats and preserve the physical and mental health of students.
- Develop and implement innovative research based online instruction methods that remain practical and effective in wartime conditions.
- Offer innovative online instruction solutions developed by teachers—meanwhile, it would be good also to involve the private sector in the development of online instruction solutions.
- Carry out constant online monitoring of the problems and needs of teachers regarding the implementation of distance learning and professional development on ICTs, to quickly respond to changing needs in wartime conditions.
- Introduce a broad information cooperation across sectors for supporting schools, teachers and students in distance learning and to mitigate the digital divide.

- Support public initiatives aimed at overcoming the challenges faced by schools and teachers in the organisation of distance learning.
- Introduce a self-assessment tool to teachers for assessing digital competence based on the Digital Competence Framework for Citizens (DigComp 2.0 and 2.1) and the Digital Competence Framework for Educators (DigCompEdu).
- A road map for promoting the use of digital technologies at education institutions in Ukraine should be developed. This would be a helpful contribution that could be used for ensuring the creation of action plans for the regions of Ukraine and amalgamated communities on the use of ICTs.
- An up-to-date analysis of the current state of equipment of schools and teachers' needs should be conducted.

We have compiled the above recommendations with the following policymakers and practitioners in mind:

6.1 | Governmental institutions

The recommendations are relevant to governmental institutions such as the Ministry of Education and Science of Ukraine. This includes education departments at various levels. The recommendations also aim to support the development of efforts at governmental institutions, such as action plans, programmes, and events for supporting teachers in wartime conditions.

6.2 | Ministry of digital transformation

The Ministry of Digital Transformation of Ukraine plays an important role in the process of ensuring education in Ukraine. In particular, it is tasked with planning, ensuring and controlling the process of equipping educational institutions with digital means for the organisation of education.

6.3 | Ministry of social policy

The Ministry of Social Policy of Ukraine is tasked with analysing the capacity of low-income families to provide school-aged children with access to internet and digital learning tools. It also works with promoting public initiatives to collect computer equipment that has been used at schools and by families.

6.4 | Education institutions

Schools and other education institutions need to elaborate strategies on how to build communication channels, online support and how to inform school teams about work plans as well as available technical and software tools. Strategies should be developed also on how to communicate about opportunities for students and parents in the conditions of a specific region and institution. Education institutions should be responsive to the needs of teachers and students and should support teacher innovations.

6.5 | Teacher training institutions

Institutions that provide teacher training have to introduce methodical support for online instruction; in particular, on the use of ICTs and online instruction, information about new online opportunities for teachers. Teacher

training institutions should advise teachers about distance learning and should set up call centres for counselling teachers on the use of ICTs and solving ICT related problems.

6.6 | Research institutions

Research institutions, in particular the National Academy of Educational Sciences of Ukraine should provide advice on the use of digital tools and methods for supporting online teaching in various subject areas. It is important to create new digital platforms with online instruction resources for teachers of all subjects. This should include step-by-step instructions for the use of online resources, with consideration of existing risks in wartime considerations.

6.7 | Civil society

Civil society organisations can play a role in supporting online learning in quarantine conditions. Also, civil society can contribute to the monitoring and evaluation of access to education services. Civil society organisations contribute in wartime conditions by observing the extent to which student rights to education are met and limited.

6.8 | Ombudsman for education

The Education Ombudsman of Ukraine is involved in matters of compliance with the right of students to quality education and proper working conditions for teachers. The ombudsman can be consulted about issues that pertain to the right of students to quality education and the working conditions of teachers. The ombudsman develops plans for monitoring compliance with such rights.

6.9 | Local authorities

Local authorities work with developing and implementing programmes in education. Relevant for this study are notably programmes that grant support for public initiatives to overcome wartime challenges faced by teachers when introducing distance learning.

7 | CONCLUSIONS

The beginning of the large-scale aggression of the Russian Federation against Ukraine in 2022 halted the modernisation of school infrastructures in Ukraine. This affected also the online learning environments available for schools, because government efforts were directed to ensuring (1) the preservation of the lives of teachers and students, as well as, (2) the organisation of education in wartime conditions. In a sense, teachers *continued* to work with students remotely in the spring of 2022 in Ukraine. The preceding COVID-19 quarantine had introduced them to this mode of instruction. The education system in Ukraine witnessed the emergence of a new phenomenon; namely, global virtual classrooms. These are virtual reality classrooms online that bring together students on Ukrainian territory with schoolchildren who are refugees to other countries.

We underscore as valuable professional qualities of Ukrainian teachers the skills in using ICTs that teachers acquired in both COVID-19 and wartime conditions and their ability to adapt to new circumstances. Teachers

and other pedagogical specialists remain key players today in the implementation of distance learning and the development of digital environments in education. Their ability to use ICTs is vital in wartime circumstances when schools and other educational institutions have partially switched to remote modes of operation. It is especially important to constantly update the range of resources for teachers, improve their qualifications in the use of digital learning tools, and create conditions for distance teaching. Surveying teacher opinions, determining their level of digital competence and digital readiness is a strategic task that should be part of the New Ukrainian School reform. This strategic task together with the introduction of innovations that contribute to the effective organisation of education should be part of ongoing efforts for monitoring the quality of education in Ukraine. It is important that research and survey findings are used to inform the management of education, teacher training, schools, scientific institutions and other education stakeholders. This represents an important contribution for resolving challenges faced by teachers in wartime Ukraine.

In this article, we have summarised results from a self-assessment survey of digital competence among educators in Ukraine. The recommendations listed contribute with suggestions for how survey results can be used in practice by education management bodies, teacher training institutions, secondary schools, research institutions and other stakeholders. We have focused on identifying measures that are necessary for supporting teachers and schools in carrying out distance learning during the war in Ukraine.

Results of the study on which we report in this article showed that the success of the organisation of education during the COVID-19 quarantine and in wartime circumstances in Ukraine has depended on the active interaction of all who participate in education. Also, that success depends on the flexibility and adaptability to learning conditions, the technical capabilities of institutions and, above all, the ability of teachers to use modern digital technologies.

Finally, we underscore that the conclusions presented in this article represent the point of view of the authors, and the authors analysis of results from a public opinion survey of the pedagogical community in Ukraine. We recommend that further similar studies are undertaken for informing decisions at different levels of the education system in Ukraine.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at: *Information Technologies and Learning Tools*, https://doi.org/10.33407/itlt.v85i5.4669, reference number 7; NAES of Ukraine Digital Library, https://lib.iitta.gov.ua/724564/, reference number14; NAES of Ukraine Digital Library, https://lib.iitta.gov.ua/730808/, reference number 15.

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