THE EFFECT OF DIGITAL INEQUALITY ON VINNYTSIA HIGHER SCHOOL TEACHERS EDUCATING REMOTELY DURING LOCKDOWN

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Annotation. *The purpose of this article is to define the concept of digital inequality and investigate the situation with digital inequality among teachers of Vinnytsia higher educational institutions by data analysis of the anonymous survey.*

The article presents and analyzes the results of the study in terms of equal access of teachers to modern digital technology, which was used to provide the educational process during the switch to remote teaching, and the impact of social and economic conditions in the country on digital inequality among teachers and its further effect on the quality of the remote learning during the lockdown period.

The empirical basis of the study is the author's research involving questionnaires and interviews, which were held among the teachers of Vinnytsia higher educational institutions within the period of March-May 2021.

Keywords: *digital inequality, distance learning, lockdown, digital divide, higher education.*

Introduction. With the switch of educational institutions to distance learning for the period of lockdown the certain question "whether teachers of educational institutions are ready for the move to an emergency remote teaching?" arose. What is the effect of digital divide on the quality of the educational process, taking into consideration that the available software tools, users' skills, technical condition of computer technology are the key components which ensure the implementation of distance education, and high-quality Internet connection functions as a bridge connecting teacher and student?

What is the impact of the social and economic situation in the country on the digital inequality among teachers of educational institutions, and thus, how it can reflect on the quality of distance learning.

The purpose of the article is to analyze the current situation regarding digital inequality among teachers of Vinnytsia higher education institutions and investigate the effect of digital inequality on the educational process during the switch to remote learning in the period of lockdown.

Literature Review and Discussion. The analysis of previously carried out studies proves that the issue of digital and information inequality has attracted the attention of a number of scientists, including S. Lobovikov, J. Nielsen, O. Baranov and V. Zhuravsky, M. Rodionov, I. Zhyliaev.

The problem of digital inequality, the digital divide, which later resonated with the world, was first defined in the UN Development Program in 1997, which covered

virtually all known global human problems at the time. The term "digital inequality" was introduced to denote the difference between "digital poverty" and "digital wealth". A digital society index was developed to describe the quantitative characteristics of digital inequality, namely:

1. Computer infrastructure, which includes the number of personal computers per capita, the number of household computers per family, the ratio of the number of PCs installed in the public sector and in commercial institutions (except rural population), the number of PCs for learning and educational institutions; the percentage of personal computers connected to the network, the cost of software and computer maintenance.

2. Digital infrastructure, which includes the number of telephone lines per family, the number of failures per line, the cost of phone calls on local telephone lines, the number of TV sets per capita, the number of mobile phones per capita, the number of cable TV subscribers.

3. Internet infrastructure, namely the volume of e-commerce, the number of household Internet users, the number of the Internet users for business purposes, the number of the Internet users for learning purposes.

4. Social infrastructure, i.e. the number of secondary school students, the number of vocational school students, the number of press readers, availability of civil liberties.

The term "digital divide" came into use in 1999 after the publication of the US Department of Commerce report "Falling Through the Net: Defining the Digital Divide."

The term "digital divide" or its synonyms "inequality", "disunity" was used in public by former US President Clinton in 1999 to characterise the different possibilities for Americans in their access to information infrastructure and to define a national strategy for the transition to the digital society [2].

At the international level, the issue of digital inequality was first raised in the Okinawa Charter of the Global Information Society, which was signed in the summer of 2000 by the G8 Heads of State. According to this document, an international expert Council of the Digital Opportunity Task Force (DOT Force) was formed, which developed an action plan to be presented to the Leaders of the G8 countries at the meeting in Genoa in the summer of 2001.

In 2006, the UN General Assembly, in its resolution № A / RES / 60/252, proclaimed a World Information Society Day, one of the objectives of which was to raise awareness of ways to overcome the "digital divide".

UNESCO indicated the main groups of social dimensions, according to which the following groups of gaps are formed: economic resources; geography (asymmetry between urban and rural areas); age; sex; language; education, social and cultural backgrounds; physical adequacy [3].

An attempt to determine the strategic directions of the development of the digital society in Ukraine was made in 2007. The Law "On Basic Principles of Information Society Development in Ukraine for 2007-2015" was adopted, which defined strategic directions in Ukraine for the first time, and provided, in particular, "creating conditions for computer and information literacy of all segments of the population" and "giving

every person the opportunity to acquire knowledge, skills and abilities to use information and communication technologies in education, upbringing and training" [4]. Now it can be admitted that the goal set in this law has not been achieved.

In the scientific literature, the issues concerning unequal access to modern information technology are joined together in the term "digital divide". The term came into common use in the United States in the mid-1990s and was first used to denote the gap between different social groups concerning their ability to purchase a computer.

Among scientists there exist different views on the concept of digital inequality.

S. Lobovikova considers digital inequality as an element of information inequality, a new type of social differentiation which arises from the various possibilities of using the latest information and telecommunication technologies. According to the scholar, digital inequality has technological nature and characterizes the different ability of countries to provide access to modern information infrastructure (telephone, Internet, databases, knowledge bases, etc.) both nationally and for certain groups of the population in order to use the information effectively in practices [5, p. 6, 13].

According to O. Baranov, social inequality evokes digital inequality. Among the main factors which influence the access to information and knowledge, the scientist determines the economic situation, educational level, age, place of residence [6].

V. Inozemtsev's view of the impact of technological progress on property inequality is quite newsworthy: "Social tendencies of recent decades demonstrate that the society, which adheres to the freedom of scientific research and effectively uses the results of technological progress, causes the property inequality rise on a scale unknown to the history. This paradox can be fully explained by the logic of the social systems development, and the nature of such inequality and its deepening lie in the hard-core differences among people in terms of their capacities and talents, and hence in their potential for success in production based on the acquisition and use of new knowledge. Thus, the supremacy of the principles of freedom cannot guarantee the equality that has been considered their consequence for centuries. In our opinion, this is one of the most unexpected social results of the unrestrainable progress of science and technology, progress to which there is no reasonable alternative today" [7].

Jakob Nielsen defines the phenomenon of digital divide as the state when "a certain part of the population has significantly better opportunities to benefit from the use of modern technologies than the rest of the population" [8]. He identifies 3 types of digital divide (Economic Divide, Usability Divide and Empowerment Divide) [8].

The first type is the definition of economic inequality in the original sense of the term, i.e. such inequality when a certain part of the population cannot afford to purchase a computer.

The second type of divide is that, when even owing a computer, some cannot use it because most of the services available are too difficult for this group of users to understand.

The third type of divide is the case when the computer and the Internet are extremely easy to use, not everyone will take full advantage of the latest technologies.

Research methods. In order to study the impact of the three types of digital divide (according to J. Nelson) on the educational process during the switch to remote learning in the period of the COVID-19 lockdown, we conducted a survey among teachers of Vinnytsia higher education institutions within April-May 2021, which involved 137 respondents.

Results and discussion. The first question was to find out what digital equipment is owned". Teachers could choose several answers. The following results were obtained:

54 teachers, who constitute 39.4% of respondents reported about owing their personal computer.

Laptops are owned by 109 teachers, which is 79.6% of respondents;

- 30 teachers who constitute 21.9% of the surveyed responded having a tablet;

- Smartphones are owned by 122 teachers, who constitute 89.1% of the respondents;

- The "other" option was chosen by two of the teachers, which is 1.5% of respondents.

The next question was aiming to find out which operating system is installed in the smartphones they own: "If you have a smartphone specify the operating system installed on it." The following responses were received:

- 77.4% of respondents mentioned Android;

- IOS was indicated by 11, 7% of respondents;

- Windows was noted by 9, 5% of respondents;

- 1.5% of respondents chose the answer "Other".

Alongside the above study, the simultaneous research among full-time students of Vinnytsia universities was carried out. The study involved 562 students of higher learning [9]. The obtained results indicated that the majority of students that is 525 or 93.4% own a smartphone. As for teachers, 89.1% of them responded they have smartphones. 77.4% of teachers and 75.6% of students have the Android operating system installed, which must be taken into account when developing educational mobile applications.

The next question aimed to find out the technical condition of digital technology, owned by teachers of educational institutions which was used during the distance learning. The question was as follows: "Does the technical condition and operational capabilities of your digital technology satisfy the implementation of distance learning?" The following responses were received:

- 26.3% of respondents are fully satisfied with the technical and operational condition of their digital equipment;

- 35.8% of respondents are almost completely satisfied with the state of digital technology;

- 35.8% of respondents are partially satisfied with the state of digital technology;

And 2.2% of respondents are dissatisfied with the technical and operational condition of their digital technology.

In conclusion, from these answers it can be stated that 38% of teachers (35.8% + 2.2%) were not able to perform their professional functions due to improper technical condition of their digital devices, and their own digital technology being outdated. This is considered a very sizable, negative indicator, especially in the period when

educational institutions were forced to abandon the classic classroom learning and move to emergency distance learning.

The aim of the next question was to investigate the quality of Internet connection: "How do you assess the quality of Internet traffic?"

The following responses were provided:

- High quality of Internet connection was reported by 21.9% of respondents;
- 59.1% of respondents stated about average quality;
- 16.1% of respondents reported about insufficient quality;
- 2.9% of respondents responded having low quality of Internet connection.

Insufficient and low quality of the Internet, as evidenced by 19% (16.1% + 2.9%) of the surveyed teachers, means that teachers spent much more time and effort on the preparation and placement of educational materials. It was observed that 19% of teachers do not have the possibility to broadcast high quality video lectures online, which makes it impossible to implement the online learning process, since the Internet in this case is the "bridge" that connects teacher and student.

In response to the question "Does your digital technology support software load during remote teaching?" the following results were obtained:

- 42.3% of respondents responded that their technology fully supports it;
- 40.1% of respondents chose "not always" option;
- 16.8% of respondents answered "partially";
- "Doesn't support" option was chosen by 0.7% of respondents.

Thus, we should admit that modern educational software load is not supported by digital technology of 17.5% (16.8% + 0.7%) of respondents.

The following question aimed to determine the socio-economic conditions of higher school teachers, their ability to overcome the inappropriate condition of their computer technology and fit it to the requirements of the maintaining distance learning. The question was formulated as follows: "Do you have the financial means to purchase new modern digital devices for personal professional activity?" The following results were obtained:

- 6.6% of the surveyed teachers can afford to purchase modern digital devices within a month;
- 10.2% responded about the above affordability within six month time;
- 26.3% of the surveyed teachers had the opportunity to purchase new digital devices within a year;
- "Within two years" was the option chosen by 17.5% of respondents;
- It should be noted that 39.4% of respondents stated that they do not have any financial means.

The fact that 17.5% of teachers plan to buy new modern digital technology within two years, and 39.4% do not consider this issue at all due to the lack of financial means, indicates the lack of socio-economic security of teachers.

It should be emphasized that the previously asked question "Does the technical condition and operational capabilities of your digital technology satisfy the

implementation of distance learning?" 35.8% of teachers responded that they were only partially satisfied with the technical condition of their own digital devices, while 2.2% said they were not satisfied at all.

In personal communication with the respondents, we revealed that the option "can afford to buy a modern computer within two years" was chosen by some respondents as they were ashamed to choose the option "no financial means".

The interviewed teachers in the personal communication stated they use only their own digital devices for distance learning, whose inappropriate technical condition, and the lack of affordability to purchase a new one, significantly makes the implementation of distance learning more complicated, putting a brake on the use of modern software technologies that could improve the quality of presentation and perception of learning information.

To the question "How do you assess the level of complexity in software setting up and working during distance teaching?" the following responses were obtained:

- 7.3% of respondents noted a high level of complexity;
- 16.1% of surveyed teachers chose the option "above average";
- "Average" was reported by 60.6% of respondents;
- 8% of respondents reported about below average level of complexity;
- And only 8% of respondents identified a low level of complexity.

The above results indicate the unavailability of teachers to move to emergency remote teaching in terms of COVID-19 pandemic in Ukraine, the lack of developed methodology for distance learning, the lack of developed online educational tools and relevant educational software to be used in the educational process in blended forms of learning. The transition to distance learning showed that only 8% of respondents consider the use of software, its setting up to be of a low level of complexity.

Taking into account the above analyzed, we are convinced that the use of blended learning that is combining distance teaching in the educational teaching practice with classroom learning in the periods before the lockdown would have been more beneficial and effective than the transition to emergency remote teaching.

To the question "Do you have problems with knowledge of foreign languages when setting up software for distance learning?" the following results were obtained:

- 17.5% of respondents mentioned "never";
- "Very rarely" was chosen by 29.2% of respondents;
- 46.7% responded "sometimes";
- 4.4% of respondents answered "quite often";
- 2.2% of respondents mentioned they faced technological problems very often.
- Asked to assess the level of their computer skills 16.1% of respondents declared about a high level of their own skills;
- 35.8% of respondents stated "above average";
- 44.5% of the surveyed teachers responded they had an average level of their own skills;
- 3.6% of respondents claimed about below average level.

Conclusions. The study conducted among teachers of Vinnytsia higher education institutions gives evidence of the effect of digital divide on the quality of distance learning. At the forefront is the impact of the socio-economic situation in the country on the level of teachers' abilities to purchase modern digital devices, to be able to use the modern educational software product and online educational services properly in the educational process. As well as make full use of the options and facilities provided by the Internet and be fully involved in educational processes.

This study indicates the socio-economic insecurity of a prevailing number of teachers. 38% of teachers assessed the technical condition of their computer equipment used during the implementation of the remote teaching as unsatisfactory. At the same time, 39.4% of teachers reported that they did not have the financial means to purchase new modern digital devices within the period of more than two years. Therefore, we cannot consider digital inequality from the standpoint that some professionals have an advantage over others being more educated and skilled in the use of computer technology. Since 2021, we have been experiencing the situation of initial understanding of the digital inequality concept, which was used in the United States in the 90s as the ability to purchase a modern computer.

It can be stated that the switch to remote learning when the lockdown was declared caused the situation when a significant number of teachers did not have proper possibilities to provide quality teaching materials due to insufficient affordability of digital technology. In turn, a significant number of students lacked the access to appropriate educational information acquisition for the same reasons.

Every year a large number of different software products is developed, which in turn requires more advanced digital devices. In order to avoid lagging behind at the state level, teachers and students must master those software products that can be used in professional activities in time. But how to implement the above mentioned, if 39.4% of surveyed teachers don't have the financial means to buy a modern computer or other digital device? The emergency remote teaching has clearly revealed the problem of digital inequality among teachers, the socio-economic situation in the country, which negatively affects both teachers' social living conditions and their professional activities.

It can be concluded that the level of decline in the socio-economic status of citizens correlates with the growth of digital inequality in the country. Thus, the Government of Ukraine should pay very serious attention to this issue, taking decisive economic steps. At the state level, negotiations should be held with the largest manufacturers of modern digital equipment on the possibility of assembling this equipment in Ukraine. The Ukrainian domestic market free from customs duties and value-added tax on a certain list of digital equipment will allow reduce the cost of digital devices and technology. State-owned banks should provide micro-loans to the population to purchase computers or other digital devices at a minimum interest rate. The fact that the state will not receive from customs payments and tax revenues is less crucial compared to the consequences of lagging behind in the fields of education and science, which is considered a direct threat to the existence of Ukraine as a state.

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