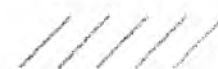




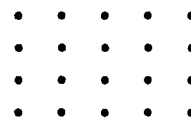
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Analysis of the Target Use and Tools of Information Communication Technologies by Students of Pedagogical Specialties

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Abstract— The article presents the results of research on the target use tools of information communication technologies by students of universities of teacher education in the learning process and everyday life. Changes in the goals of using modern digital tools are analyzed, namely, a clear trend towards the transition to mobile devices, which requires adaptation of the appropriate software and didactic support. A constant expansion of the goals of using information and communication tools has been established, which actualizes the issues of forming the information culture of students. The increase in the duration and complexity of work with Internet resources is determined. This confirms the importance of a high-quality selection of Internet sources for learning and the growth of the role of media literacy. A scheme for the use of information and communication technologies by students is proposed, in which the role of Internet resources as the main carriers of digital information is highlighted. The factors contributing to the reduction of "digital overwork" of students and optimization of the use of ICT tools in the educational process are identified.

Keywords— *Information Communication Technologies, digital tools, target use of ICT, Internet resources, students of pedagogical specialties*

I. INTRODUCTION

In modern conditions, the introduction of digital technologies is becoming a necessity not only in the professional activities of a person, but also in his daily life. With the help of modern Information and Communication Technologies (ICT), one can conduct scientific research and receive a quality education, conduct business and receive administrative services, make purchases, pay for any goods and services, communicate and organize the work of specialists on common projects, etc.

Such a widespread use of ICT encourages a detailed analysis of their use in society, in particular, by students for learning and at home [1]. The relevance of this problem is confirmed by the relevant legislative documents of the state level [2]. In particular, in the context of building a digital state in educational institutions, the dominant role of information

and communication technologies for organizing learning has been determined [3].

Today, in emergency situations caused by the coronavirus epidemic and the war period, the issue of the rational use of digital technologies has become especially acute, since the educational process has been completely transferred to a distant form. This has led to an increase in the time students use ICT, which has a negative impact on their health [4, 5]. So, there is a contradiction between the need for intensive work with digital tools and their negative impact on psycho-physiological health, in particular, Internet addiction [6]. Thus, the problem of rational use of ICT by students is relevant.

The purpose of the study is to determine the main of target of use ICT tools by students of pedagogical specialties and factors contributing to the reduction of their "digital overwork".

II. RESEARCH OF TRENDS IN THE USE OF ICT TOOLS BY STUDENTS OF PEDAGOGICAL SPECIALTIES

The importance of studying various aspects of the use of ICT in the educational process and in everyday life is confirmed by the large number of scientific publications on this topic. In the studies of scientists from different countries, contradictions are identified in the use of ICT in education regarding their effectiveness in the educational process [7-9]. It is also important to study the introduction of distance education at different levels in different countries and, in particular, in Ukraine [10-13]. Our research is primarily aimed at determining the goals of using ICT by students in order to identify problematic issues. The solution of these issues will contribute to the optimal use of ICT tools in the context of the digitalization of society.

The study was conducted for five years (from 2016 to 2021) at Ternopil Volodymyr Hnatiuk National Pedagogical University. Students of pedagogical specialties of different years of study were involved, which reduced the probability of subjective assessment. A total of 378 students-respondents

were involved in the study (Table 1), which were grouped as follows:

- I group – 1st-2nd years of study students who have started their studies and are in the process of adapting to the conditions of a higher education institution.
- II group – 3rd years of study students – fully adapted to the educational process.
- III group – graduates of the first and second levels of education (bachelor's and master's), which completing their studies and actively solving issues of future employment.

In order to analyse the ability of students to use modern digital tools, the first question in the study was to determine the level of their provision with their own ICT tools. In addition, it was also important to highlight which of the available means the student uses for learning.

TABLE I. DISTRIBUTION OF RESPONDENTS BY COURSES OF STUDY

Groups of respondents	Number of Students Interviewed		
	2016/2017	2019/2020	2020/2021
I	58	54	52
II	31	28	28
III	43	40	44
Total	132	122	124

So, according to an anonymous survey on the use of ICT tools by students, from 2016 to 2021, there was a gradual decrease in the use of personal computers and tablets for solving educational problems [6]. The result of the survey is shown in Table 2. At the same time, there has been an increase in interest in laptops, mobile ICTs, and smart TVs. It should be noted that applicants for higher education use several personal ICT tools for different needs.

TABLE II. PROVISION OF STUDENTS BY PERSONAL ICT TOOLS

Type of Tools	Groups	Number of Surveyed Students					
		2016/2017 ac. year		2019/2020 ac. year		2020/2021 ac. year	
		count	%	count	%	count	%
Computer	I	48	82.7	35	64.8	31	59.6
	II	25	80.6	18	64.3	16	57.1
	III	35	81.4	23	57.5	25	56.8
Laptop	I	43	74.1	53	98.1	52	100.0
	II	25	80.6	28	100.0	27	96.4
	III	35	81.4	39	97.5	44	100.0
Tablet	I	8	13.8	11	20.4	8	15.3
	II	5	16.1	6	21.4	3	10.7
	III	7	16.3	7	17.5	5	11.4
Mobile phone	I	43	74.1	46	85.2	49	94.2
	II	24	77.4	24	85.7	28	100.0
	III	33	76.7	36	90.0	44	100.0
Smart TV	I	0	0.0	4	7.4	7	13.5
	II	0	0.0	6	21.4	6	21.4
	III	0	0.0	6	15.0	10	22.7

If recently the main information and communication tool with which students completed their learning tasks was a personal computer, then according to surveys, there was a gradual decrease in their number (from 81.8% in 2017 to 58.1% in 2021). After a short rise in the popularity of their own tablets and a corresponding increase in the percentage of

their use (from 15.2% in 2017 to 19.7% in 2020), the 2021 survey indicated a further refusal of students to use this tool. Only 12.1% of graduate students in 2021 owned a tablet.

Research 2016-2021 also pointed to a trend of growing interest in laptops, mobile devices, due to their versatility and high technical characteristics, ergonomic interface. Despite the fact that a significant proportion of students are proficient in several means of communication at the same time, as of 2021, the use of laptops (99.2%) and mobile devices (98.4%) is dominant.

Thus, when analysing the survey results, one should note a clear trend of transition from personal computers to mobile devices. This is primarily due to the need for such tools for solving cognitive and vital tasks, their financial availability and the possibility of attracting people with cognitive impairments [14]. The emergency learning conditions caused by the pandemic have also significantly affected the increase in the need for the use of laptops and mobile devices among students.

It should be noted that since the 2019/2020 academic year, modern smart TVs, which have ample learning opportunities, have also been included in the tools that students have begun to use in the educational process (Fig. 1).

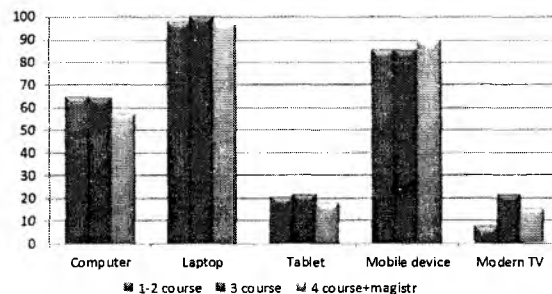


Fig. 1. Diagram of providing students with ICT tools

Thus, the presence of a significant number of modern ICT tools among applicants for higher education necessitated the study of the following issue: analysis of the areas of use of ICT tools in the daily life of students (training, work, life, recreation, etc.). The results of the student survey conducted during the study period are shown in Table 3.

Analysis and comparison of the survey results suggest that during 2016–2021 there was a constant expansion of the scope of the use of information and communication tools, not only for the purpose of completing educational tasks in the classroom and outside the classroom, but also for communicating with friends, organizing leisure activities and fulfilling the tasks of employers.

In particular, if in 2008/2009, according to surveys, only half of the students used ICT in the process of completing the tasks of practical and laboratory classes, learning tasks for independent and individual work outside the classroom, then in 2020/2021, all students used digital tools. This is caused, first of all, by the general digitalization of educational processes and the transition to distance learning in modern conditions.

Noteworthy are the data on the use of information and communication tools for information retrieval, which during the study period showed consistently high results (more than 90% of respondents) (Fig. 2). Such results confirm the

importance of a quality selection of Internet sources for learning and the growth of the role of media literacy.

TABLE III. PURPOSES OF STUDENTS' USE OF ICT TOOLS

№	Target Use of ICT Tools	Number of surveyed students					
		2008/2009 ac. year		2013/2014 ac. year		2020/2021 ac. year	
		Count	%	Count	%	Count	%
1	Performing tasks in the classroom	45	69.2	92	88.5	124	100.0
2	Execution of educational tasks in extracurricular time	28	43.1	83	79.8	124	100.0
3	Search for information	57	87.7	101	97.1	116	93.5
4	Communicate with friends	11	16.9	88	84.6	114	91.9
5	View and listen to audiovisual materials	17	26.2	50	48.1	114	91.9
6	Entertainment (computer games)	24	36.9	71	68.3	110	88.7
7	Execution of tasks of the employer	0	0.0	5	4.8	26	20.9
8	Performing duties at the place of work	0	0.0	2	1.9	31	25.0

Despite the positive dynamics of the growth in the number of students who used digital tools at the place of employment, this figure reached only 25%. In our opinion, this is partly due

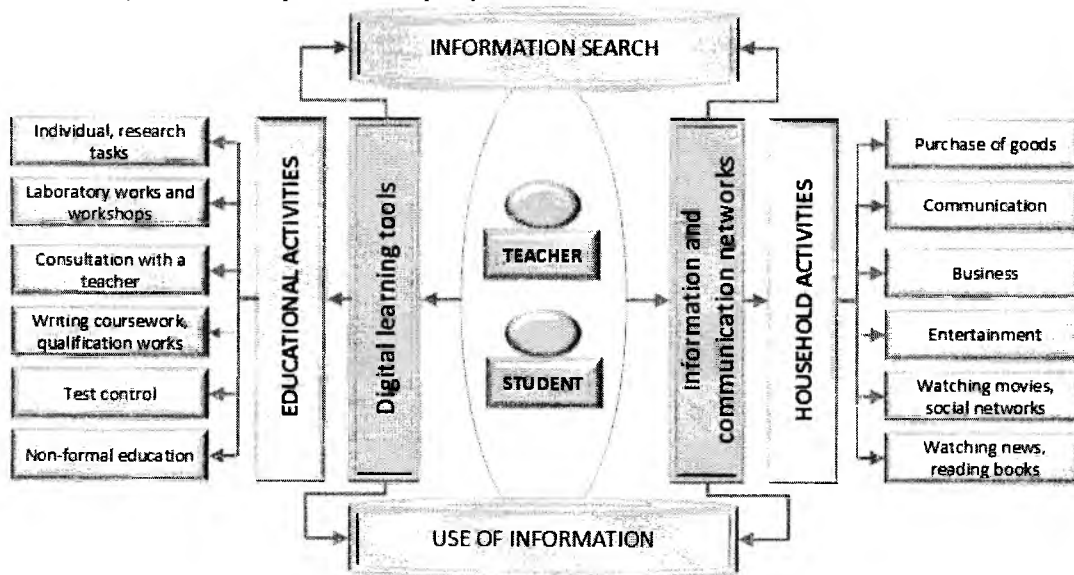


Fig. 3. Generalized scheme of the use of ICT tools by students

The proposed scheme of using digital technologies in the process of training students of pedagogical specialties, in particular, future professionals in vocational and technological education, is basic and open to further expansion. This scheme allows you to visualize the main purposes of the use of ICT tools, as well as to illustrate the niche that currently occupies work with Internet resources as the main carriers of digital information.

III. TRENDS IN USE OF INTERNET RESOURCES

The use of Internet resources is the basis in the realities of the organization of modern education at different levels. The

to the relatively small number of employed students and actualizes the problem of dual education. After all, the formation of professional competencies of future specialists requires strengthening their practical training.

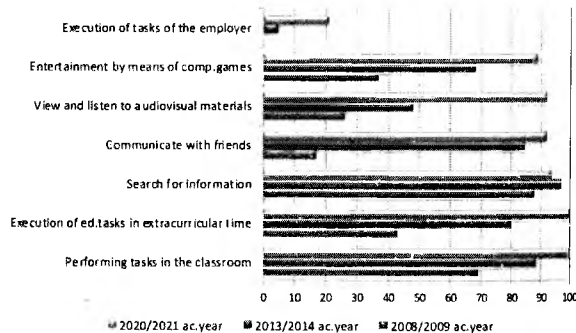


Fig. 2. Target use of ICT tools by students

One way to address this issue is to combine training in laboratories and classrooms with on-the-job training. In addition, the employment of applicants for higher education in accordance with educational programs and future qualifications is important. Based on the results of research, we have proposed a generalized scheme of student use of ICT tools, which is presented in Fig. 3.

coronavirus pandemic has led to mandatory implementation in 2020-2021 distance and blended learning, which were based on the organization of the educational process using digital technologies, in particular online platforms for conducting classes (Zoom, GoogleMeet, BigBlueButton, Padlet digital boards, etc.), social networks (Viber, Telegram, WhatsApp), LMS systems (GoogleClass, Moodle). It is also important to use web resources to organize the research work of students with the involvement of virtual laboratories and specialized websites [15]. Consequently, in the conditions of distance learning, all participants in the educational process, when solving typical and creative tasks in the conditions of classroom and extracurricular work, are 100% focused on

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Based on the processed results of surveys on the purposes of students' use of Internet resources, as well as these activities and activities that distract students, identified factors that contribute to their relief from excessive use of ICT (Fig.6).

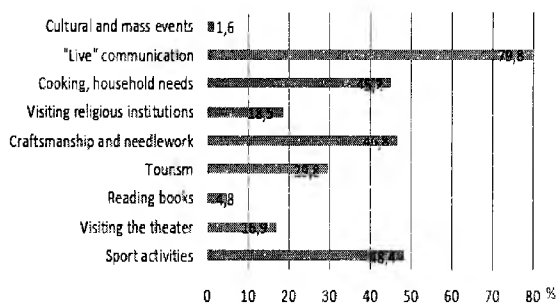


Fig. 6. The factors unloading students from excessive use of ICT

CONCLUSION

In the context of the digital transformation of society, there is a constant expansion of the goals of using ICT tools by students both to complete educational tasks in the classroom and outside the classroom, and to communicate with friends, organize leisure activities and fulfil employers' tasks. This actualizes the problem of forming the information culture of the participants in the educational process.

An analysis of the results of surveys conducted from 2016 to 2021 among students of pedagogical specialties indicates a clear trend of transition from personal computers to mobile devices. This requires the adaptation of appropriate software and the development of didactic tools used in the educational process.

Noteworthy are the data on the use of information and communication tools for information retrieval, which during the study period showed consistently high results (more than 90% of respondents). Such results confirm the importance of a quality selection of Internet sources for learning and the growth of the role of media literacy.

Based on the research results, we have proposed a generalized scheme for the use of ICT by students of pedagogical specialties. It allows you to visualize the main purposes of using ICT tools, to illustrate the niche that today is occupied by working with Internet resources as the main carriers of digital information.

The results of the research also confirm the significance of the problem of "digital overwork" of students. Based on the survey, factors were identified which allow to distract students from the excessive use of digital tools.

This study does not exhaust all aspects of the problem of rational use of ICT tools by students. Therefore, we consider it promising for further research to develop a methodology for optimizing the use of ICT tools by students, taking into account definite factors of their unloading from the excessive use of digital technologies. The indicated results of the study in the post-war and post-COVID period will contribute to the modernization and further development of education based on the use of ICT in the context of the digitalization of society.

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