

## DISTANCE LEARNING ELEMENTS OF MEDICAL EDUCATION FROM THE POINT OF VIEW OF THE TEACHER IN WAR-TIME: RESULTS OF THE DEMETER SURVEY

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**The purpose** of the *Distance Learning Elements of Medical Education from the point of view of the Teacher in waR-time study (DEMETER)* was to establish the attitudes of the academic staff from medical higher education institutions on the elements of distance education in the training and retraining of doctors in such a crisis situation as hostilities on the territory of the state.

**Methods.** The DEMETER survey is a cross-sectional study based on a standardized sample survey of the experts in medical education (n=106). We separately analyzed the answers of representatives from civilian institutions (DEMETER-C, n=72) and institutions of the Ministry of Defense of Ukraine (DEMETER-M, n=34) to clarify the specifics of the opinion of the academic staff providing training for military doctors.

**Results.** The study showed minimal differences in the opinions of the academic staff from medical educational institutions regarding distance learning, collected during hostilities in Ukraine. About 40% of the teachers surveyed would not like distance learning to continue in the future, although the vast majority have positive attitudes towards fully online short courses, such as master classes or seminars. Academic staff from DEMETER-M arm use videoconferencing software other than Zoom/BigBlueBotton less often, have less experience in online teaching due to stricter requirements for military trainees who are required to be at their workplace, therefore, teaching is carried out onsite even in extreme conditions. Military academic staff are less satisfied with the videoconferencing platforms they work on, they are more likely to consider cybersecurity courses for teachers necessary and are less likely to express negative personal attitudes toward online learning activities. Representatives from DEMETER-M arm prefer online classes lasting 2 to 4 hours, primarily in the morning.

**Conclusions.** The discussion about medical education, including its online component, is interdisciplinary in nature and must consider the opinion of clinicians and medical scientists who carry out such training. Hostilities on the territory of Ukraine resulted in change in the forms of teaching, strengthening the role of synchronous and asynchronous online education, including the training and retraining of doctors, comparable to pandemics.

**Keywords:** online learning, training of doctors, retraining of doctors, expert opinion, postgraduate education, Ukraine.

## РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ-ОПИТУВАННЯ «DISTANCE LEARNING ELEMENTS OF MEDICAL EDUCATION FROM THE POINT OF VIEW OF THE TEACHER IN WAR-TIME (DEMETER)»

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**Метою** дослідження *Distance Learning Elements of Medical Education from the point of view of the Teacher in waR-time (DEMETER)* було встановити ставлення професорсько-викладацького складу медичних вищих навчальних закладів до елементів дистанційної освіти в навчанні та перепідготовці лікарів у такій кризовій ситуації, як бойові дії на території держави.

**Методи.** Опитування DEMETER є перехресним дослідженням, заснованим на стандартизованому вибірковому опитуванні експертів з медичної освіти (n=106). Ми окремо проаналізували відповіді представників цивільних установ (DEMETER-C, n=72) та установ Міністерства оборони України (DEMETER-M, n=34), щоб з'ясувати особливості, характерні для викладачів, які навчають військових лікарів.

**Результати.** Дослідження показало мінімальні розбіжності в думках викладачів медичних закладів вищої освіти щодо онлайн-навчання, зібраних під час бойових дій в Україні. Близько 40% опитаних викладачів не хотіли б, щоб дистанційне навчання продовжувалося в майбутньому, хоча переважна більшість ставилася позитивно до повністю онлайн формату коротких курсів, таких як майстер-класи або семінари. Науково-педагогічні працівники гілки дослідження DEMETER-M рідше використовують інше програмне забезпечення для відеоконференцій, ніж Zoom/BigBlueBotton, мають менший досвід онлайн-навчання через суворіші вимоги до військовослужбовців, які повинні залишатись на робочому місці навіть у екстремальних умовах, тому навчання проводиться очно. Науково-педагогічні працівники військових

закладів менш задоволені платформами для відеоконференцій, на яких вони працюють; вважають необхідними курси з кібербезпеки для викладачів і менш схильні висловлювати негативне особисте ставлення до онлайн-навчання. Представники групи DEMETER-M віддають перевагу онлайн-заняттям тривалістю від 2 до 4 годин, переважно вранці.

**Висновки.** Дискусія про медичну освіту, в тому числі її онлайн-компонент, має міждисциплінарний характер і повинна враховувати думку клініцистів і вчених-медиків, які проводять таке навчання. Бойові дії на території України призвели до зміни форм навчання, посилення ролі синхронної та асинхронної онлайн-освіти, у тому числі підготовки та перепідготовки лікарів, порівняної з пандеміями.

**Ключові слова:** онлайн навчання, підготовка лікарів, перепідготовка лікарів, експертна думка, післядипломна освіта, Україна.

**Introduction.** We live in a world that is changing extremely rapidly. Several years ago, under the influence of the COVID-19 pandemic, the education systems of almost all countries experienced a boom in the use of online teaching technologies, many of which are still actively used, proving their convenience and demand among both teachers and students [1-5].

Since 2022, when education in most countries has returned to the usual onsite mode, Ukraine has been experiencing another challenge – hostilities on its territory. The realities existing in the country today (destruction of infrastructure – buildings in which education is conducted, disruption of their normal operation, power outages, air raids, during which classes must be stopped and students must go to specially equipped shelters) have led to the preservation of the use of distance learning in the Ukrainian education system, both synchronous and asynchronous elements are actively used [6-10]. However, it should be noted that two years after russian massive invasion of Ukraine, onsite education dominates in most regions of the country.

Medical education is also showing a positive trend with the resumption of onsite education at higher education institutions, including elements of distance learning as needed. However, in a country where hostilities are taking place, elements of distance learning remain extremely relevant in medical, especially postgraduate education [11-14]. Today, even older doctors who are wary of online technologies and prefer in-person classes have acquired the necessary skills to take online courses and earn continuing education credits [15]. Similarly, it is necessary to develop the teacher to meet high technical requirements in order to conduct high-quality classes not only in person, but also using online platforms and technologies [1, 3, 12, 14, 16, 17]. As noted in the work of Mirosavljević et al. [17], two main components are necessary to ensure the tasks of online teaching: technological competence and access. Unfortunately, as a rule, there are absent trainings for teachers in Ukraine

aimed to increase their technical awareness of the capabilities of online platforms, video recording programs for classes, etc. As a result, opportunities that are useful for learning are often missed, such as clinical cases with a branched scenario, tests with tasks/answers in the form of images/videos, demonstrating data during classes, useful links, etc. Often, teachers choose the platform that is convenient for them for online classes, which leads to confusion among trainees, since they study with teachers using different platforms. Therefore, the process of self-education of a teacher, particularly a technical one, is important and requires constant improvement in parallel with the development of recent technical innovations in teaching [3, 17].

However, the attitudes towards online teaching in the institution itself are also important, since a decision on a single educational platform with a database of students/trainees and teachers, with a single profile and convenient access to teaching materials and online classrooms should be made at the level of the institution [1]. Moreover, at the institution level, additional time should be allocated for the development of materials, the implementation of new digital technologies, and the self-education of the teacher [3]. That is, the problem of training teachers of various institutions in online work skills, individualized to the needs of each institution, should be addressed at the systemic level, including funding for such training programs, as well as technical support for websites and educational platforms of institutions [3, 11, 17].

In the context of such dynamic changes in education, it is important to understand the attitudes towards innovations of the participants: students/trainees and teachers [11]. Previously, we conducted a study DILEMMA, the purpose of which was to find out the attitudes towards distance learning of medical interns and doctors participating in retraining and advanced training programs [18, 19]. This survey not only allowed us to collect the necessary information and, on its basis, improve the teaching process in the Ukrainian Military Medical Academy, but also

made it possible to identify two special categories of respondents: "denialists" and "pleasers", which must be considered in such surveys [19]. The next stage of our research was to study the opinions of the academic staff and experts in the field of medical education, and a survey study was planned (*Distance Learning Elements of Medical Education from the point of view of the Teacher in War-time - DEMETER*), in which experts from different regions of Ukraine were interviewed in order to establish attitudes on the elements of distance education in the training and retraining of doctors in the context of such a crisis situation as hostilities on the territory of the state.

**Methods.** The DEMETER survey is a cross-sectional study based on a standardized sample survey of the experts in medical education from various institutions of Ukraine, including universities, postgraduate education institutions (with focus on Ukrainian Military Medical Academy), institutions of the Ministry of Education and Science of Ukraine, etc. (n=106). The experts surveyed had teaching experience and participated in organizing and conducting distance learning activities. The survey was conducted in the period from May 2, 2022, to February 6, 2024.

The survey was anonymous and voluntary. Google questionnaire was sent to the experts after discussing the list of potential respondents by the working group of the study. When considering the candidates for survey, we were guided by the lecturers' performances at online events of continuous medical education, the availability of open data for correspondence with such experts, their consent to receive a Google forms questionnaire. The requirements for experts were the presence of teaching experience and participation in educational online activities, active scientific and methodological work, authority in the field of medical education. In case of no answer to the question, the indicators were calculated based on the actual answers with an additional indication of their number. Subsequently, we separately analyzed the answers of representatives from civilian institutions (DEMETER-C - from civil institutions, n=72) and institutions of the Ministry of Defense of Ukraine (DEMETER-M - from military institutions, n=34) to clarify the specifics of the opinion of teachers providing training for military doctors.

The subject of the study was the responses of teachers reflecting their attitudes towards distance medical education in both organizational and technical aspects.

Answers ranging from 0 to 10 points were categorized as follows: 0-3 points were considered as a rather negative/weak response to the question; 4-6 points were considered as a neutral response to the question; 7-10 points were considered as a rather positive/great response to the question.

*Statistical analysis*

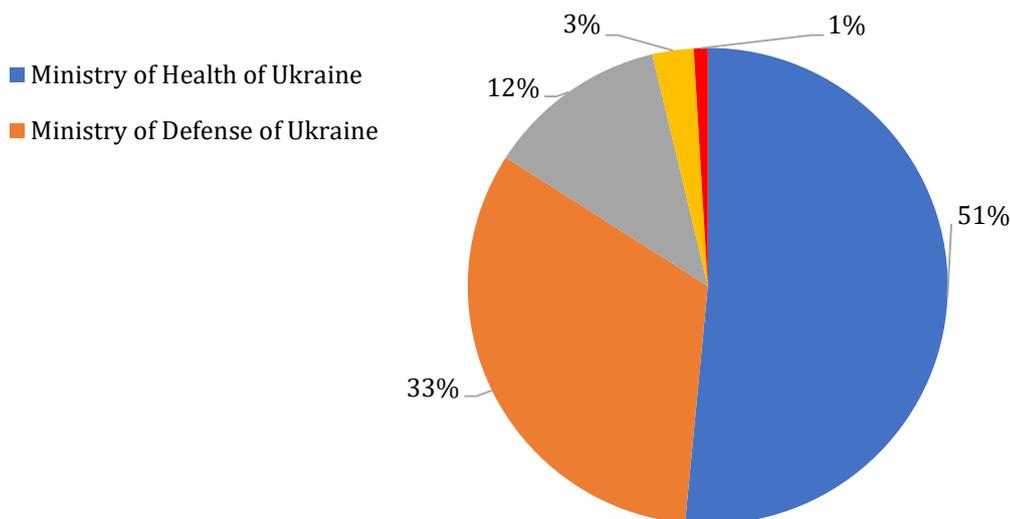
Data were presented as the mean  $\pm$  standard deviation (M $\pm$ SD) or as frequency in %. We used methods of parametric statistics (a two-sample t-test with different variances). Alternative variation was used to compare frequency indicators. Differences at  $p < 0.05$  were considered significant.

Microsoft Excel 2010 and the standard statistical package STATISTICA 6.0 were used for calculations.

**Results.** Among the respondents, the majority were employees of civil institutions (Figure), 89 (84%) respondents were employees of higher education institutions.

The main characteristics of the respondents are presented in Table 1. It should be noted that among the surveyed academic staff of military institutions, the proportion of professors was significantly higher than among civilian respondents (26.5% versus 6.9%, respectively,  $p < 0.05$ ). Half of all respondents had teaching experience of 20 years or more without significant differences between the groups, but representatives of the DEMETER-M arm had significantly less experience in online teaching ( $2.6 \pm 1.1$  versus  $3.6 \pm 1.4$  years in the DEMETER-C arm,  $p = 0.0007$ ). The statistical difference in the experience of online teaching obtained in our study for experts from military institutions is logical, since during the COVID-19 pandemic, apart from periods of complete lockdown, teaching of military doctors continued in onsite mode.

The overwhelming majority of respondents in the total group and subgroups noted the COVID-19 pandemic as the main reason for the transition to online teaching (Table 2). Respondents were also unanimous in the fact that the greatest contribution to the implementation of online teaching in their institution was made by the COVID-19 pandemic and hostilities in Ukraine from 24.02.2022, whereas Antiterrorist operation in Ukraine from 2014 had little impact on this process (see Table 2). High rates of kurtosis and skewness noted for these questions indicate the obviousness of the answer, due to which the normal distribution of the option was violated.



**Figure.** Departments to which the institutions in which the DEMETER survey respondents were affiliated belong.

Table 1

### Main characteristics of the DEMETER study respondents

Parameter	Total group (n=106)	DEMETER-C (n=72)	DEMETER-M (n=34)	P Value for DEMETER-C vs. DEMETER-M
Age				
30-39 years old	22 (20.8%)	15 (20.8%)	7 (20.6%)	>0.05
40-49 years old	29 (27.4%)	23 (31.9%)	6 (17.7%)	>0.05
50-59 years old	31 (29.2%)	19 (26.4%)	12 (35.3%)	>0.05
≥60 years old	24 (22.6%)	15 (20.8%)	9 (26.5%)	>0.05
Gender				
Male	75 (70.8%)	55 (76.4%)	20 (58.8%)	>0.05
Female	31 (29.2%)	17 (23.6%)	14 (41.2%)	>0.05
Position				
Head of institution	1 (0.9%)	1 (1.4%)	0	>0.05
Head of Department	19 (17.9%)	14 (19.4%)	5 (14.7%)	>0.05
Professor	14 (13.2%)	5 (6.9%)	9 (26.5%)	<0.05
Associate Professor	35 (33.0%)	24 (33.3%)	11 (32.4%)	>0.05
Teacher	37 (34.9%)	28 (38.9)	9 (26.5%)	>0.05
Length of teaching service				
Up to 5 years	17 (16.0%)	10 (13.9%)	7 (20.6%)	>0.05
5-9 years	14 (13.2%)	11 (15.3%)	3 (8.8%)	>0.05
10-14 years	8 (7.6%)	7 (9.7%)	1 (2.9%)	>0.05
15-19 years	14 (13.2)	10 (13.9)	4 (11.8)	>0.05
≥20 years	53 (50.0%)	34 (47.2%)	19 (55.9%)	>0.05
Mean length of teaching service (M±SD), years	19.7±11.6	20.1±11.5	18.9±11.9	0.66
Mean length of online teaching (M±SD), years	3.3±1.3	3.6±1.4	2.6±1.1	0.0007

The MOODLE educational platform was chosen as the main one in teaching by a third of respondents, it was statistically insignificantly more often named by the academic staff of military institutions (see Table 2), while more than half of the respondents did not find any serious disadvantages in the educational platform they used (Table 2).

The answers regarding videoconferencing software used for online classes varied significantly. Thus, in the general group, ZOOM was most often chosen (47.6%), in the DEMETER-C group – soft other than ZOOM/BigBlueBotton (55.5%), in the DEMETER-M group – more than half of the academic staff also preferred ZOOM (57.6%). Moreover, in the DEMETER-M group, respondents used the

BigBlueBotton significantly more often than in the DEMETER-C group (18.2% versus 1.4%, p<0.05) and more than twice as less often - non-ZOOM/BigBlueBotton (24.2% versus 55.5%, p<0.001).

More than half of all respondents were satisfied with the chosen soft, 63.4% in the DEMETER-C group, but only 30.3% in the DEMETER-M group. DEMETER-

M respondents complained significantly more often about the need to re-enter due to the limited conference time (27.3% versus 9.9% in the DEMETER-C group, p<0.05). Complaints about the limited functionality of the free version of the software and the inconvenience of working with many trainees were equally frequent in both subgroups (see Table 2).

*Table 2*

**Main characteristics of respondents' attitudes towards distance learning**

Parameter	Total group (n=106)	DEMETER-C (n=72)	DEMETER-M (n=34)	P Value for DEMETER-C vs. DEMETER-M
<b>What was the main reason for the introduction of distance education at your institution?</b>				
COVID-19 pandemic	86 (81.1%)	58 (80.6%)	28 (82.4%)	>0.05
Hostilities in Ukraine since 24/02/2022	14 (13.2%)	9 (12.5%)	5 (14.7%)	>0.05
Hostilities in the east of Ukraine since 2014	1 (0.9%)	1 (1.4%)	0 (0)	>0.05
Reform of education at the institution as planned	5 (4.7%)	4 (5.6%)	1 (2.9%)	>0.05
<b>To what extent, in your opinion, has the hostilities in the east of Ukraine since 2014 affected the implementation of distance learning?</b>				
Rather didn't affect	67 (63.2%)	46 (63.9%)	21 (61.8%)	>0.05
Neutral effect	17 (16.0%)	12 (16.7%)	5 (14.7%)	>0.05
Strong influence	22 (20.8%)	14 (19.4%)	8 (23.5%)	>0.05
Mean by 10-point scale	3.2±3.5	3.2±3.6	3.3±3.5	0.95
<b>To what extent, in your opinion, has the COVID19 pandemic affected the implementation of distance learning?</b>				
Rather didn't affect	3 (2.8%)	2 (2.8%)	1 (2.9%)	>0.05
Neutral effect	4 (3.8%)	3 (4.2%)	1 (2.9%)	>0.05
Strong influence	99 (93.4%)	67 (93.0%)	32 (94.1%)	>0.05
Mean by 10-point scale	9.1±1.8	9.2±1.7	9.1±2.0	0.780
Kurtosis	12.5	7.0	13.7	
Skewness	<2	-2,6	-3.4	
<b>To what extent, in your opinion, did the large-scale war in Ukraine from 24/02/2022 affect the implementation of distance learning</b>				
Rather didn't affect	2 (1.9%)	1 (1.4%)	1 (2.9%)	>0.05
Neutral effect	13 (12.3%)	8 (11.1%)	5 (14.7%)	>0.05
Strong influence	91 (85.9%)	63 (87.5%)	28 (82.4%)	>0.05
Mean by 10-point scale	8.6±2.0	8.7±1.8	8.4±2.2	0.420
Kurtosis	3.85	2.8	4.8	
Skewness	<2	<2	<2	
<b>What platform is used for distance learning at your institution?</b>				
	N=104	N=71	N=33	
MOODLE	35 (33.7%)	20 (28.2%)	15 (45.5%)	>0.05
Another	69 (66.3%)	51 (71.8%)	18 (54.5%)	>0.05
<b>What, in your opinion, are the disadvantages of this system (multiple choice is available)?</b>				
Inconvenient interface	5 (4.7%)	5 (6.9%)	0	>0.05
Slowly work	7 (6.6%)	5 (6.9%)	2 (5.9%)	>0.05
Limited functional possibilities	22 (20.8%)	13 (18.1%)	9 (26.5%)	>0.05

It is not possible to implement some forms of education	19 (17.9%)	15 (20.8%)	4 (11.8%)	>0.05
It has no significant disadvantages	59 (55.7%)	40 (55.5%)	19 (55.9%)	>0.05
What videoconferencing software do you use during classes?				
N for this answer	105	72	33	
Zoom	50 (47.6%)	31 (43.1%)	19 (57.6%)	>0.05
BigBlueBotton	9 (8.6%)	1 (1.4%)	6 (18.2%)	<0.05
Another	46 (43.8%)	40 (55.5%)	8 (24.2%)	<0.001
What are the disadvantages of the videoconferencing software which you use?				
N for this answer	104	71	33	
Conference time is limited, need to re-enter	16 (15.4%)	7 (9.9%)	9 (27.3%)	<0.05
The program often is not responding	10 (9,6%)	6 (8.5%)	4 (12.1%)	>0.05
Limited functionality of the free version	19 (18.2%)	10 (14.1%)	9 (27.3%)	>0.05
It is inconvenient if there are many trainees	25 (24.0%)	17 (23.9%)	8 (24.2%)	>0.05
Everything is satisfactory	55 (52.9%)	45 (63.4%)	10 (30.3%)	<0.001
Assess on a 10-point scale the need to conduct special courses to raise teachers' awareness of the capabilities of the platform being used, to create assignments and tests, and other activities				
Rather no need	19 (17.9%)	15 (20.8%)	4 (11.8%)	>0.05
Doesn't matter	26 (24.5%)	19 (26.4%)	7 (20.6%)	>0.05
Urgently needed	61 (57.6%)	38 (52.8%)	23 (67.7%)	>0.05
Mean by 10-point scale	6.6±3.1	6.2±3.0	7.4±3.2	0.084
Assess on a 10-point scale the need to conduct special courses on full-fledged technical management of your own cycle (downloading materials, tests, etc.)				
N for this answer	105	71	34	
Rather no need	21 (20.0%)	16 (22.5%)	5 (14.5%)	>0.05
Doesn't matter	27 (25.7%)	19 (26.8%)	8 (23.5%)	>0.05
Urgently needed	57 (54.3%)	36 (50.7%)	21 (61.8%)	>0.05
Mean by 10-point scale	6.5±3.3	6.2±3.3	7.0±3.3	0.240
Assess on a 10-point scale the need to conduct special courses on cybersecurity, especially in wartime				
N for this answer	105	72	33	
Rather no need	14 (13.3%)	11 (15.3%)	3 (9.1%)	>0.05
Doesn't matter	23 (21.9%)	18 (25.0%)	5 (15.1%)	>0.05
Urgently needed	68 (64.8%)	43 (59.7%)	25 (75.8%)	>0.05
Mean by 10-point scale	7.3±3.0	6.9±3.1	8.2±2.3	0.038
Rate on a 10-point scale whether you personally like online classes				
Don't like at all	28 (26.4%)	23 (31.9%)	5 (14.7%)	<0.05
Neutral attitudes	30 (28.3%)	20 (27.8%)	10 (29.4%)	>0.05
Really like it	48 (45.3%)	29 (40.3%)	19 (55.9%)	>0.05
Mean by 10-point scale	5.6±3.3	5.3±3.4	6.4±2.9	0.087

The need to conduct special courses to raise teachers' awareness of the capabilities of the platform being used, to create assignments and tests, etc. was rated highly: more than half of the respondents found such courses urgently needed,

as well as special courses on full-fledged technical management of their own cycle (downloading materials, tests, etc.) and courses on cybersecurity without statistical difference between the arms of the study (see Table 2). At the same time,

DEMETER-M representatives rated the need for cybersecurity courses significantly higher on a 10-point scale (8.2±2.3 versus 6.9±3.3 in the DEMETER-C group, p=0.038).

Finally, about half of the respondents expressed positive attitudes towards online classes, although the DEMETER-M representatives expressed negative attitudes towards online classes significantly less often (14.7% versus 31.9% in the DEMETER-C group, p<0.05).

The academic staff positively responded to the question about the need to post various materials on educational web portals for both synchronous and asynchronous forms of learning (Table 3), however, the experts of the DEMETER-M group significantly less often noted the need to provide online access to textbooks (32.4% versus 56.9% of the DEMETER-C group, p<0.05). Respondents of the total group most often noted the need to provide access to lectures (82.1%) and tests (80.2%).

*Table 3*

**Answers to the question "What online materials should be presented on online portal? What must be mandatory?" (Multiple choice was available)"**

Parameter	Total group (n=106)	DEMETER-C (n=72)	DEMETER-M (n=34)	P Value for DEMETER-C vs. DEMETER-M
Discipline/cycle program	66 (62.3%)	45 (62.5%)	21 (61.8%)	>0.05
Schedule	68 (64.2%)	47 (65.3%)	21 (61.8%)	>0.05
Test questions	85 (80.2%)	57 (79.2%)	28 (82.4%)	>0.05
Clinical tasks	65 (61.3%)	44 (61.1%)	21 (61.8%)	>0.05
Lectures	87 (82.1%)	60 (83.3%)	27 (79.4%)	>0.05
Reference materials	62 (58.5%)	44 (61.1%)	18 (52.9%)	>0.05
List of References	64 (60.4%)	44 (61.1%)	20 (58.8%)	>0.05
Textbooks (online)	52 (49.1%)	41 (56.9%)	11 (32.4%)	<0.05
Textbooks (.pdf)	54 (50.9%)	37 (51.4%)	17 (50.0%)	>0.05
Methodological materials of the department	63 (59.4%)	42 (58.3%)	21 (61.8%)	>0.05
Links to online recordings of lectures, workshops, etc.	69 (65.1%)	47 (65.3%)	22 (64,7%)	>0.05
Links to websites of specialized Associations, Societies, etc.	59 (55.7%)	44 (61.1%)	15 (44.1%)	>0.05

The positive aspects of distance learning were assessed generally equally both in the total group and in the subgroups of the study (Table 4). High kurtosis and skewness values in this case also indicated the obviousness of some answers. The respondents' answers in the subgroups differed significantly only in two positions. Representatives of the DEMETER-M group were more enthusiastic about the fact that students would not be able to prompt each other (61.8%) and would have the opportunity to attend specialized conferences online during classes (85.3%) compared to the DEMETER-C respondents (36.1% and 62.5%, respectively; p<0.05 and p<0.01). Moreover, for the latter position, the average 10-point assessment also differed significantly (DEMETER-C 7.1±3.0; DEMETER-M 8.5±2.0, p=0.005). The 10-point assessment score for the option "Students are encouraged to work independently" was also significantly higher in the DEMETER-M group (DEMETER-C 5.5±3.0; DEMETER-M 6.7±2.5, p=0.043).

The negative aspects of distance learning were also assessed generally equally both in the total group and in the study subgroups (Table 5). The influence of the factor of working from home was significantly weaker in the DEMETER-M group compared to that of DEMETER-C (weak impact 67.7% vs. 47.2%, p<0.05; the 10-point assessment indicator for the position was 2.2±2.6 and 3.4±3.4, respectively, p=0.012). The fact that the student can find answers via the Internet and pass them off as his/her own was more important for DEMETER-C group (great impact 54.2% vs. 32.4% for DEMETER-M, p<0.05).

The idea of presentation of successful students' activities in educational materials (well-designed reports, publications, etc.) was positively assessed by respondents without differences between arms of the study (Table 6). Interestingly, about 40% of the teachers surveyed would not like distance learning to continue in the future, although the vast majority have positive attitudes towards online short courses, such as master classes and seminars (see Table 6).

Table 4

**Positive aspects of distance learning according to results of the DEMETER study**

Parameter	Total group (n=106)	DEMETER-C (n=72)	DEMETER-M (n=34)	P Value for DEMETER-C vs. DEMETER-M
<b>The process is well documented and transparent</b>				
Weak	8 (7.6%)	5 (6.9%)	3 (8.8%)	>0.05
Neutral attitudes	29 (27.4%)	17 (23.6%)	12 (35.3%)	>0.05
Great	69 (65.1%)	50 (69.4%)	19 (55.9%)	>0.05
Mean by 10-point scale	7.3±2.5	7.4±2.6	6.9±2.4	0.27
<b>No need to go somewhere, search for an audience</b>				
Weak	4 (3.8%)	3 (4.2%)	1 (2.9%)	>0.05
Neutral attitudes	15 (14.2%)	12 (16.7%)	3 (8.8%)	>0.05
Great	97 (82.0%)	57 (79.2%)	30 (88.2%)	>0.05
Mean by 10-point scale	8.4±2.3	8.3±2.5	8.8±1.9	0.22
Kurtosis	2.9	2.4	4.2	
Skewness	<2	<2	2.1	
<b>You can choose a time convenient for everyone</b>				
Weak	4 (3.8%)	3 (4.2%)	1 (2.9%)	>0.05
Neutral attitudes	18 (17.0%)	14 (19.4%)	4 (11.8%)	>0.05
Great	84 (79.2%)	55 (76.4%)	29 (85.3%)	>0.05
Mean by 10-point scale	8.1±2.3	8.0±2.4	8.4±2.34	0.28
Kurtosis	2.3	2.0	2.34	
Skewness	<2	<2	<2	
<b>Students are encouraged to work independently</b>				
Weak	23 (21.7%)	19 (26.4%)	4 (11.8%)	>0.05
Neutral attitudes	40 (37.7%)	27 (37.5%)	13 (38.2%)	>0.05
Great	43 (40.6%)	26 (36.1%)	17 (50.0%)	>0.05
Mean by 10-point scale	5.9±2.9	5.5±3.0	6.7±2.5	0.043
<b>Listeners cannot prompt each other</b>				
Weak	24 (22.6%)	19 (26.4%)	5 (14.7%)	>0.05
Neutral attitudes	35 (33.0%)	27 (37.5%)	8 (23.5%)	>0.05
Great	47 (44.3%)	26 (36.1%)	21 (61.8%)	<0.05
Mean by 10-point scale	6.0±3.0	5.7±3.1	6.7±2.7	0.084
<b>Everyone works out all the necessary tasks</b>				
Weak	13 (12.3%)	11 (15.3%)	2 (5.9%)	>0.05
Neutral attitudes	26 (24.5%)	19 (26.4%)	7 (20.6%)	>0.05
Great	67 (63.2%)	42 (58.3%)	25 (73.5%)	>0.05
Mean by 10-point scale	7.0±2.6	6.7±2.8	7.6±2.0	0.067
<b>The possibility to use recorded materials to lighten the vocal load of the teacher</b>				
Weak	9 (8.5%)	7 (9.7%)	2 (5.9%)	>0.05
Neutral attitudes	19 (17.9%)	14 (19.4%)	5 (14.7%)	>0.05
Great	78 (73.6%)	51 (70.8%)	27 (79.4%)	>0.05
Mean by 10-point scale	7.5±2.7	7.2±2.9	8.2±2.2	0.067
<b>The possibility of redirecting trainees to a conference on the topic of the class that takes place online</b>				
Weak	11 (10.4%)	10 (13.9%)	1 (2.9%)	>0.05
Neutral attitudes	21 (19.8%)	17 (23.6%)	4 (11.8%)	>0.05
Great	74 (69.8%)	45 (62.5%)	29 (85.3%)	<0.01
Mean by 10-point scale	7.5±2.8	7.1±3.0	8.5±2.0	0.005

Table 5

**Disadvantages of distance learning according to results of the DEMETER study**

Parameter	Total group (n=106)	DEMETER-C (n=72)	DEMETER-M (n=34)	P Value for DEMETER-C vs. DEMETER-M
<b>Technical problems when connecting, the need for a working Internet:</b>				
Weak	17 (16.0%)	13 (18.1%)	4 (11.8%)	>0.05
Neutral attitudes	34 (32.0%)	25 (34.7%)	9 (26.5%)	>0.05
Great	55 (51.9%)	34 (47.2%)	21 (61.8%)	>0.05
Mean by 10-point scale	6.4±2.8	6.1±2.9	7.0±2.6	0.12
<b>Lack of direct contact with the trainee</b>				
Weak	21 (19.8%)	12 (16.7%)	9 (26.5%)	>0.05
Neutral attitudes	29 (27.4%)	18 (25.0%)	11 (32.4%)	>0.05
Great	56 (52.8%)	42 (58.3%)	14 (41.2%)	>0.05
Mean by 10-point scale	6.5±2.9	6.8±2.9	5.8±2.9	0.11
<b>Lack of practical work with the patient</b>				
Weak	5 (4.7%)	3 (4.2%)	2 (5.9%)	>0.05
Neutral attitudes	10 (9.4%)	8 (11.1%)	2 (5.9%)	>0.05
Great	91 (85.9%)	61 (84.7%)	30 (88.2%)	>0.05
Mean by 10-point scale	8.7±2.0	8.7±2.1	8.6±2.0	0.63
Kurtosis	<2	<2	3.3	
Skewness	<2	<2	<2	
<b>It is not convenient to work from home</b>				
Weak	57 (53.8%)	34 (47.2%)	23 (67.7%)	<0.05
Neutral attitudes	31 (29.2%)	24 (33.3%)	7 (20.6%)	>0.05
Great	18 (17.0%)	14 (19.4%)	4 (11.8%)	>0.05
Mean by 10-point scale	3.4±2.3	3.9±3.4	2.2±2.6	0.012
<b>The student may find answers via the Internet and pass them off as his/her own</b>				
Weak	19 (17.9%)	11 (15.3%)	8 (23.5%)	>0.05
Neutral attitudes	37 (34.9%)	22 (30.6%)	15 (44.1%)	>0.05
Great	50 (47.2%)	39 (54.2%)	11 (32.4%)	<0.05
Mean by 10-point scale	6.3±3.0	6.7±2.9	5.6±3.0	0.085
<b>Students may not listen to the teacher or disconnect from the classes, citing technical reasons</b>				
Weak	10 (9.4%)	7 (9.7%)	3 (8.8%)	>0.05
Neutral attitudes	21 (19.8%)	12 (16.7%)	9 (26.5%)	>0.05
Great	75 (70.8%)	53 (73.6%)	22 (64.7%)	>0.05
Mean by 10-point scale	7.8±2.5	8.0±2.5	7.6±2.6	0.38
Kurtosis	<2	<2	7.5	
Skewness	<2	<2	<2	

Representatives of the DEMETER-C group are mostly ready to study online for 3-4 hours a day (45.8%), and 44.1% respondents in the DEMETER-M group are ready to study for 2 and the same proportion - 3-4 hours a day. Most respondents in both branches (more than 80%) prefer to conduct online classes in the morning hours (see Table 6).

**Discussion.** Recent studies have been conducted on the assessment of distance learning in Ukraine in crisis situations [3, 6, 10]. However, most of them focused on education in general, and only several scientists assessed medical education

and its online component [7-9, 11, 14]. Furthermore, even these few studies did not consider institutions engaged in the training of military doctors, although some authors noted the importance of integrating distance learning into the process of training/retraining doctors and pharmacists during hostilities in Ukraine [20-22]. This online approach makes it possible to provide doctors with recent information on the management of patients with combat trauma, in particular regarding their therapeutic support, primary and secondary prevention of pathology of internal organs associated with the consequences

of trauma, contributing to the widespread introduction of new therapeutic functional and organizational models into practice [19, 23], as well as optimizes the process of training of rehabilitation specialists, promotes synchronization of the actions between multidisciplinary team and the rehabilitation specialist by introducing online consultations and educational online activities for doctors, patients, and their relatives when providing rehabilitation

care [24]. The importance of this form of teaching in the training of military doctors is evidenced by the fact that from 2020 to 2024 the number of specialists trained online at the Faculty of Retraining and Advanced Training of the Ukrainian Military Medical Academy (Kyiv, Ukraine) increased by 4.5 times and reached 2,300 students per year (determination coefficient for the trend  $R^2=0.95$ ) [22].

Table 6

**Organizational issues for the future**

Parameter	Total group (n=106)	DEMETER-C (n=72)	DEMETER-M (n=34)	P Value for DEMETER-C vs. DEMETER-M
How do you feel about the presentation of successful student activities in educational materials (well-designed reports, master's results, publications, etc.)?				
I really support it, it motivates the students to study	76 (71.7%)	53 (73.6%)	23 (67.7%)	>0.05
It is interesting, we didn't do such a thing, but we will think about it	25 (23.6%)	15 (20.8%)	10 (29.4%)	>0.05
It is not interesting, usually the work of the trainees needs significant refinement	5 (4.7%)	4 (5.6%)	1 (2.9%)	>0.05
Would you like distance learning to remain in the usual conditions?				
Yes	61 (57.6%)	41 (56.9%)	20 (58.8%)	>0.05
No	45 (42.5%)	31 (43.1%)	14 (41.2%)	>0.05
Do you support the idea in some cases of completely remote events such as master classes, seminars, short cycles?				
Yes	86 (81.1%)	59 (81.9%)	27 (79.4%)	>0.05
No	20 (18.9%)	13 (18.1%)	7 (20.6%)	>0.05
How much time per day are you comfortable doing online classes?				
1 hour	9 (8.5%)	7 (9.7%)	2 (5.9%)	>0.05
2 hours	33 (31.1%)	18 (25.0%)	15 (44.1%)	>0.05
3-4 hours	48 (45.3%)	33 (45.8%)	15 (44.1%)	>0.05
Full working day	13 (12.3%)	12 (16.7%)	1 (2.9%)	>0.05
Another	3 (2.8%)	2 (2.8%)	1 (2.9%)	>0.05
What time is more convenient for you to teach online (several answers are possible)?				
9.00-11.00	54 (50.9%)	40 (55.6%)	14 (41.2%)	>0.05
11.00-13.00	41 (38.7%)	24 (33.3%)	17 (50.0%)	>0.05
13.00- 15.00	13 (12.3%)	11 (15.3%)	2 (5.9%)	>0.05
After 15.00	17 (16.0%)	13 (18.1%)	4 (11.8%)	>0.05
Another	8 (7.6%)	6 (8.3%)	2 (5.9%)	>0.05

It should be noted that it is important to separately evaluate online training of doctors due to significant differences in the organization of teaching, while medical education during pandemics and/or war can differ quite significantly in its online component, since in the first case, doctors, including senior students and interns, are often involved in activities to overcome the pandemic, and, therefore, work and study onsite.

However, studies in the field of evaluating medical education in crisis situations in Ukraine are more focused on the theoretical discussion of the problem and rarely consider the opinion of the academic staff. Thus, the study by Vasianovych et al. [14] included 120 students, but the results of the publication are mainly based on literary data, and the participants' assessments were not presented. Furthermore, the work of Khaniukov et al. [8] was distinguished by the theoretical

generation of proposals for optimizing the online component of medical education, without considering the opinion of teachers and/or students.

One of the deepest research assessing attitudes towards online education in Ukraine during the war was the study of Mayer et al. [11], who analyzed responses of 49 academic staff and 190 students from medical universities, moreover, they separately interviewed 9 faculty leaders. The authors focused on such general topics as interruption of education, increased workload, stress, financial and non-military difficulties, international cooperation, quality of education, and prospects. The authors did not single out a group of the academic staff training military specialists.

Previously, we published a survey study DILEMMA [19] involving 147 students/trainees allocated to groups of interns and doctors from postgraduate courses, where the focus was shifted to the practical side of implementing online learning in the context of a pandemic and hostilities in Ukraine: satisfaction with the online learning, its positive and negative features, ways of optimization from the point of view of different contingents of trainees involved in this process. As far as we know, this is the first and currently the only study that assessed the postgraduate sector of medical education separated interns and doctors with clinical experience.

The DILEMMA study assessed attitudes towards distance learning among students of the Ukrainian Military Medical Academy [19], with some of the questions coinciding with the DEMETER survey. The differences in responses between trainees and the academic staff to some common questions are surprising. For example, more than 80% of interns and doctors from postgraduate courses, i.e. trainees, responded

### Conclusions

1. The discussion about the specifics of medical education, including its online component, is interdisciplinary in nature and must consider the opinion of clinicians and medical scientists who carry out such training.

2. Hostilities on the territory of Ukraine resulted in change in the forms of teaching, strengthening the role of synchronous and asynchronous online education, including the training and retraining of doctors, comparable to pandemics.

3. The conducted study showed minimal differences in the opinions of the academic staff regarding online learning, collected during hostilities in Ukraine, while for the academic staff of military institutions, against the background of generally similar assessments with

positively to the question "Would you like distance learning to remain in the usual conditions?", while only 57.6% of the academic staff responded positively to it. At the same time, 24% of interns, 43% of doctors from postgraduate courses, and more than 80% of the academic staff in the DEMETER population support completely online short courses.

In the DILEMMA study, respondents-pleasers and respondents-denialists were identified among the trainees, who influenced the survey results [19], in the DEMETER study we did not observe deviations that allowed us to identify such contingents among the respondents, which indicates greater maturity and responsibility of the respondents who are the academic staff.

Based on the results of the DEMETER survey, work of the academic staff at the Ukrainian Military Medical Academy was optimized. Cybersecurity courses are held annually among the academic staff with updated information on emerging threats, short online cycles for retraining doctors have been introduced, and in cycles lasting up to 2 weeks, both distance and face-to-face components are included, considering the time convenient for trainees and teachers for the synchronous form of online training.

The study has some limitations. The initial characteristics contained statistical differences in the proportion of professors among respondents in the DEMETER-C and DEMETER-M groups; however, in our opinion, such a difference should not have significantly affected the answers. In some isolated cases, kurtosis and skewness indicated an incorrect distribution, which mainly reflected the "obviousness" of a particular answer and, accordingly, led to a shift in the frequencies of positive/negative answers. In such cases, we reflected the kurtosis and skewness data in tables.

civilian teachers of medical institutions, it is characteristic to use videoconferencing software other than Zoom/BigBlueBotton less often, to have less experience in online teaching due to stricter requirements for military trainees who are required to be at their workplace, therefore, teaching is carried out onsite even in extreme situations. Representatives of DEMETER-M arm are less satisfied with the videoconferencing platforms they work on, they consider cybersecurity courses for teachers to be necessary to a greater extent, they less often express a negative personal attitude towards online learning and prefer online classes lasting from 2 to 4 hours, mainly in the morning.

### Prospects for further research

This study completes the research devoted to the subjective evaluation by trainees (the

DILEMMA study [19]) and the academic staff (the DEMETER study presented in the article) of the online teaching as a part of medical education (including training and retraining of military doctors) in the conditions of hostilities on the

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