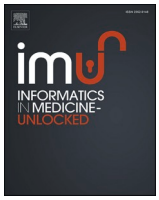
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Pros and cons of remote medical education in Ukraine in terms of COVID-19 pandemics

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ABSTRACT

Introduction: COVID-19 is an ongoing pandemic, which forced countries across the globe to adapt all daily activities to the new reality in order to stop the disease from spreading. The educational process was not an exception, it caused a sudden shift towards the exceptional introduction of online teaching and Kyiv Medical University was one of the first universities in Ukraine to assess the quality of education under the restrictive measures

Objectives: The aim was to analyze the advantages and disadvantages of online education during the COVID-19 pandemic in the learning of neurology at the Department of Neurology, Psychiatry and Physical Rehabilitation, Kyiv Medical University.

Methods: 169 students were interviewed using an online questionnaire consisting of 18 items focused on different angles of educational process.

Results: According to the obtained results, the biggest pros of online teaching included: flexibility of learning schedule, learning at your own pace; ability to develop deeper problem-solving and clinical thinking skills. Social distancing, family distractions, and internet connection issues negatively affected most students' feelings during online learning. One of the most prominent cons of online learning of neurology pointed out by the majority of medical students was a lack of practical component of training and contact with patients.

Conclusions: Online teaching, along with a number of advantages, has significant disadvantages, especially in medical education in case of studying clinical disciplines.

1. Introduction

The ongoing unprecedented COVID-19 pandemic around the world has had an enormous impact on all spheres of life [1,2]. The educational process is not an exception, it caused a sudden shift towards the exceptional introduction of online (remote) teaching, which became the main source of medical education and allowed students to continue their study [3]. The emergence of a new format of education – exclusively distance led to a radical change in the education system as a whole, leading to transformation of the concept of the educational process, which focused on online learning using information and communication technologies [4,5]. It should be noted that in recent years, prior to the introduction of quarantine due to COVID-19 pandemic, online teaching was partially implemented in medical education [6,7], demonstrating several advantages in improving student learning [8–10].

At Kyiv Medical University remote learning has been introduced by means of Google Apps for Education tools. All teachers were admitted to the teaching process after online training "Organization of distance learning with Google Workspace", having passed the exam and obtained certificates. It should be noted that before the pandemic and quarantine restrictions were introduced at Kyiv Medical University, some elements of distance learning were implemented. Although a recent systematic review showed that offline teaching and online teaching are equivalent in terms of exam results [11,12], we aimed to analyze the advantages and disadvantages of online learning during the COVID 19 pandemic in the study of neurology at the Department of Neurology, Psychiatry and Physical Rehabilitation of Kyiv Medical University.

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2. Methods

Our university was one of the first in Ukraine to adapt to the new reality and to evaluate the quality of online learning during the COVID-19 pandemic. The current sociological study involved 169 fourth-year-students enrolled into the online studying in "Kyiv Medical University" (KMU). For the convenience of our students all materials, discussions via video, notifications were provided exclusively by Google Classroom. The 20-point questionnaire was applied to assess the quality of online teaching of neurology discipline via Google Classroom and to assess the impact of COVID-19 on medical education. The evaluation of the first 18 questions was based on a 5-point system, that contained 5 choices of answers to the statement: strongly agree, agree, neutral, disagree, strongly disagree. The students were asked about being engaged into the lessons, time consumption, flexibility, quality of teaching, freedom of asking questions, interactivity, presence of unresolved issues after classes, comparison to the offline teaching, teacher's qualification in the subject, availability of textbooks and additional study materials (text and video format), levels of anxiety and exhaustion due to COVID-19 restrictions (Appendix 1). Our learners gave answers about possible interruption of their learning process online due to network or family issues. Since neurology requires physical examination of a patient, students were questioned on the topic of learning practical aspects via the provided educational videos. The last 2 questions about the significant advantages and significant disadvantages of distance learning required an open detailed answer, which was carefully analyzed.

Objectives and goals were explained at the beginning of the questionnaire to all participating students, and their enrollment was after they consent to participate in the study. Graph Pad Prism 9.0.0 (© GraphPad Software, USA) and STATISTICA 12.5 were used. 192.5 (© StatSoft, Inc., USA) to calculate descriptive statistics for survey responses.

3. Results

22% (37) of the learners strongly agreed that it was easy to engage in the lesson during online education, 39.9% (67) – agreed, 23.8% (40) of students answered "neutral", 8.3% (14) found it difficult to engage in the educational activities and 6% (10) were not fond of it at all.

26.6% (45) of KMU students strongly agreed that online teaching was as flexible, efficient and less time consuming process, 44.4% (75) agree with that statement, 12.4% (21) did not express a strong opinion on the topic, 10.1% (17) disagreed and 6.5% (11) strongly disagree with the time consumption (Fig. 1).

14.2% (24) of responders' state that online teaching is often stimulating and inspiring and 26% (44) agree with that, 30.2% (51) were indifferent, 20.7% (35) disagreed and 8.9% (15) strongly disagreed with the mentioned above.

37.3% (63) of the disciples felt that they could freely ask any question during the online lesson, 42% (71) agreed on that, 16% (27) showed no interest towards asking questions during the lessons and 4.8% (8) did not feel free to ask questions.

33.7% (57) of our students enjoyed online education due to the possibility to study at their own pace, 39.1% (66) supported that statement, 13% (22) were indifferent to this opportunity, 8.3% (14) did not perceive it as a merit and 5.9% (10) agreed with them.

21.3% (36) of participants would like the online teaching to be more interactive, 40.8% (69) supported this idea, 23.7% (40) did not see the necessity for the additional changes and 14.2% (24) agreed with them.

50.6% (85) of the students had no unresolved questions, 23.8% (40) did not feel the need to ask additional questions, 13.7% (23) of our students had some unresolved issues and 10.1% (17) had a significant number of unresolved questions after the classes.

38.7% (65) of our students found online teaching to be as effective as face-to-face teaching, 17.3% (29) remained indifferent on the matter and 44% (74) perceived online education as less effective comparing to offline.

40.2% (68) of our learners preferred online education to face-to-face teaching, 23.1% (39) were indifferent to the format of teaching the subject and 36.7% (62) would rather choose offline lessons.

80.5% (136) of our students stated that all teachers of the discipline were well prepared for each lesson, 15.4% (26) did not care for the matter and 4.2% (7) found the teachers not prepare enough for the classes (Fig. 2).

77.5% (131) found all the materials published in the class are useful for better understanding of the topic, 17.8% (30) were indifferent and 4.8% (8) did not find the provided materials as useful.

During online education 72.8% (123) of our disciples did not feel the anxiety due to the social distance and quarantine measures, 18.9% (32) were not bothered by the restrictions and 8.2% (14) experienced anxiety nonetheless.

74.6% (126) of the students did not feel exhausted during online classes due to the social distance and quarantine measures, 16.6% (28) did not notice any difference and 8.8% (15) felt exhaustion anyway.

50% (85) of our learners experienced network issues at some point during online lessons, 30.4% (51) had minor connection problems, which did not get in the way of learning the subject, and 19.7% (33) did not have network problems at all.

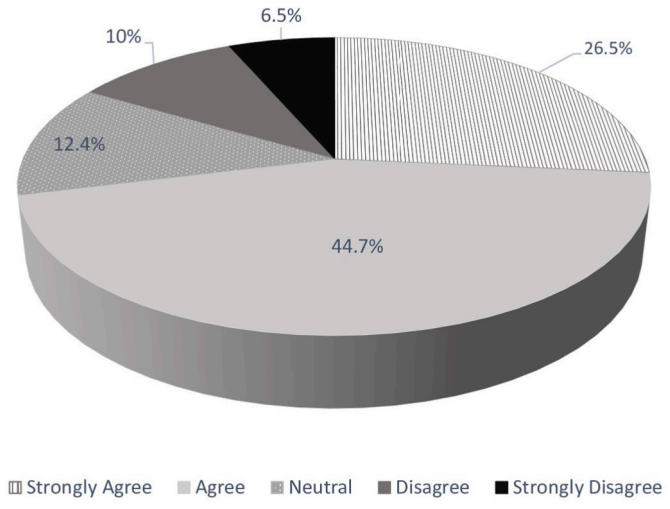


Fig. 1. The students' responses concerning flexibility, efficiency and time consumption.

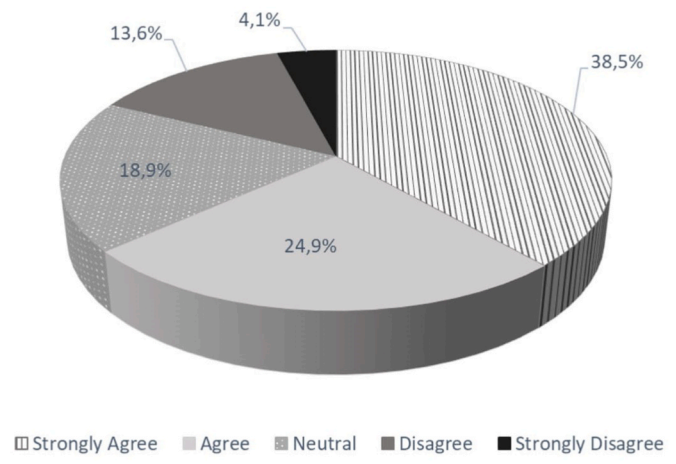


Fig. 2. The students' responses concerning qualification of the neurology teachers.

51.4% (87) stated that they were not distracted from online studying by their family issues, 20.7% (35) occasionally were taken over family issues, but it did not disrupt their education, 18.3% (31) were involved in family matters more frequently during the lessons and 10.7% (18) confessed that family issues disrupted their online education too often.

46.4% (78) were satisfied with podcasts and videos published in the class for learning the practical aspects on their own, 20.8% (35) did not note any difference and 32.8% (55) were not appeased by the provided materials demonstrating practical skills.

63.1% (106) students acknowledged they had problems with practical aspects of learning clinical discipline during online education, 19% (32) had minor issues on the matter and 17.9% (30) had no difficulties with application of the skills demonstrated via the additional materials (Fig. 3).

In the current research we also asked education applicants to elaborate their thoughts on pros and cons of online education (Table 1). Concerning the assets, 52% (88) of the disciples mentioned more flexible time table (less time consuming, more time for studying, no time was spent on the commute), 24% (40) stated that online classes were less stressful for them (they were in soothing environment, did not work under psychological pressure), 13% (22) experienced higher motivation for learning the subject and 6% (11) added that they had a possibility to read/watch more material on each topic. 23% (39) of the students said online format had no drawbacks. Among disadvantages, 45% (76) of our scholars named lack of practical skills, 17% (29) mentioned loss of face-to-face interaction between a teacher and students, 4% (6) stated that they felt less motivated compare to offline classes, 4% (6) complained on the excessive amount of classwork and 3% (5) admitted having network issues.

4. Discussion

Having gained our own experience and based on the literature data, we can summarize that distance learning has both advantages and disadvantages. The biggest advantages of online teaching platforms are: flexibility of learning schedule, including more freedom for students (opportunity to take breaks, snacks when needed), learning at your own pace (students who learn faster than others and learn the material quickly, usually like distance learning, because classmates who study more slowly do not delay them); ability to develop deeper problem-solving and clinical thinking skills due to higher motivation. In many cases of distance learning, students have to solve the problem on their own, because the teacher can't instantly answer questions that encourage students to develop research skills, spend more time thinking about information and their own opinions and answers. In this way, the student can find out the problem and solve it on his own, which helps them to build confidence and self-esteem. Remote learning also allows, like classroom learning, to implement modern approaches such as problem-based learning and team learning. In particular, during the neurology classes at our department, the above-mentioned approaches to learning are used in the discussion of clinical cases in Google Meet, when students have the opportunity, despite the distance, to feel teamwork, support each other, successfully solve clinical problems according to pre-planned scenario with the distribution of functions. The above learning formats allowes the use of online learning platforms that helps the students to absorb information independently, but also stimulates students to constructively discuss this material with colleagues, which coincides with the experience of Cara Theoret and Xue Ming, they state that online learning challenged critical thinking of medical students and helped them to work out diagnosis and treatment strategies autonomically [13]. The use of these formats in remote learning has shown its effectiveness in terms of achieving learning outcomes [12,14]. To our opinion, among the advantages of distance learning is also the ability of teachers during online learning to prepare and show podcasts, videos demonstrating thematic clinical cases of patients with rare diseases of the nervous system, which students can't always see during offline learning due to lack of patients with such pathology in the clinic during classes.

Several researches demonstrate that benefits of E-learning according to students were time-saving, flexibility, improved interaction between teachers and classmates and reduced level of anxiety compare to offline classes, our study shares the same findings [15,16]. Along with the above advantages, there are some potential disadvantages of distance learning. In particular, one of the most difficult aspects of distance learning is maintaining mental health. Not only students are worried about the health of their loved ones due to the pandemic, but some of them feel isolated and depressed, which may be due in part to a lack of interaction with friends and colleagues, leading to increased anxiety [15,17]. Because the possibility of socialization is not fully realized during offline learning, distance learning limits communication with friends and colleagues, which can lead to a decrease or complete lack of motivation and a feeling of deep sadness and anxiety [18], the students of KMU similarly experienced distress due to absence of communication with their peers. An open motivating conversation with students about their feelings, the importance of learning today with the possibility of self-realization in the future can help them maintain a positive mood. The lack of social activities, sports and extracurricular activities, which were regularly held before the pandemic, has a negative effect on the feelings of most students during distance learning. Among the barriers to using online learning platforms, some students also listed internet connection problems [3,17]. One of the significant shortcomings that concern both teachers and medical students studying clinical disciplines is the lack of a practical component of training. According to our data, which coincide with the results of Dost S. et al. [2,17], the vast majority of respondents indicate that clinical skills remain a significant barrier to online teaching, especially in neurology, which has not replaced clinical training, direct contact with patients. The KMU has partially overcome

Table 1
Pros and cons of online (remote) education according to the students.

	Characteristic	Number of students
Benefits	Decreased level of anxiety	72.8% (123)
	Flexibility of class time	52% (88)
	Better interaction with teachers	50% (85)
	Time saving	44.4% (75)
	Increased motivation for learning	13% (22)
Drawbacks	Lack of clinical practice	61% (106)
	Constant distractions	51.4% (87)
	Network issues	50% (85)
	Worse interaction with classmates	17% (29)
	No drawbacks	23% (39)

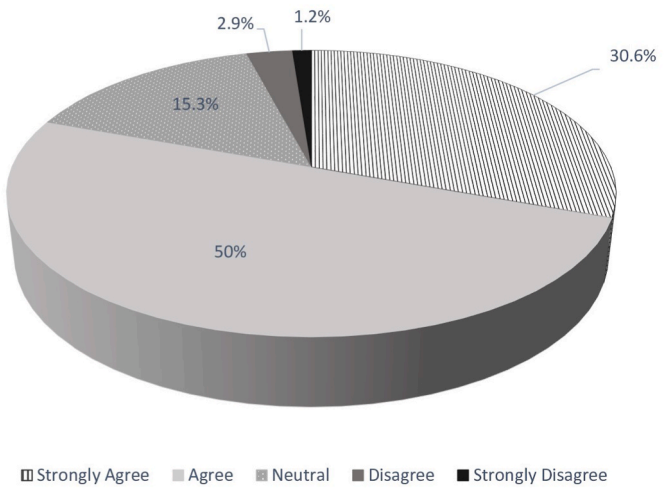


Fig. 3. The students' responses concerning practical aspects of online learning.

this problem for most clinical disciplines by teaching students in a simulation class.

5. Conclusion

Thus, the COVID-19 pandemic, which led to national quarantine restrictions, significantly affected the educational process, helping to shift teaching methods exclusively to online format using information and communication technologies. Online teaching, along with a number of advantages, has significant disadvantages, especially in medical education when studying clinical disciplines. Restriction of the normal educational process will have a long-term negative impact on the traditional health education system and will have long-term consequences after COVID-19. To improve online learning, which is likely to be an integral part of education in terms of extraordinary conditions, new approaches should be introduced more often into the educational process, such as problem-based learning and a team approach to learning, which promotes better involvement of students in the educational process and the formation of clinical thinking.

Contributions

Tetiana A. Odintsova: Conceptualization, Formal analysis, Investigation, Data curation, Writing – Original Draft. Oksana O. Kopchak: Conceptualization, Resources, Writing – Original Draft, Writing – Review & Editing. Nataliya Yu. Bachinskaya: Writing – Review & Editing. Borys B. Ivnev: Supervision. Oleksandr V. Pokanevich: Supervision. All authors read and approved the final manuscript.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix 1

Quality of Online Education Questionnaire.

1. I find it easy to engage in the lesson during online education:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
2. I find online teaching as flexible, efficient and less time-consuming process:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
3. The online teaching is often stimulating and inspiring:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
4. I can ask the questions I want during online lesson:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
5. I enjoy the online teaching, because I can study at my own pace:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
6. I would like the online teaching to be more interactive:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
7. I have a lot of unsolved questions after each online lesson:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
8. I think that online teaching is as effective as face-to-face teaching:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
9. I prefer online teaching to face-to-face teaching:
   a) strongly agree
   b) agree
   c) neutral
   d) disagree
   e) strongly disagree
10. The teachers are well prepared for the teaching sessions:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
11. All the materials published in the class are useful for better understanding of the topic cause anxiety:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
12. I feel I am being well prepared for my profession:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
13. Social distance and quarantine measures don't cause feeling of anxiety during online education:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
14. Social distance and quarantine measures don't cause feeling of exhaustion during online education:
    a) strongly agree
    b) agree

c) neutral
d) disagree
e) strongly disagree

15. My Internet connection can be problematic during online lessons:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
16. My family issues can distract me from online lessons:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
17. I can study the practical aspects myself using podcasts and video published in the class:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
18. I think I have problems with practical aspects of learning clinical discipline during online education:
    a) strongly agree
    b) agree
    c) neutral
    d) disagree
    e) strongly disagree
19. In my opinion the disadvantages of online education are:
20. In my opinion the advantages of online education are:

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