Assimilation Results Comparison of Educational Material by Senior Students of a Medical University in Distance and Face-to-Face Form Education

Irina V. Vasilyeva[a,b,1], Tatyana V. Zarubina [a] and Irina I. Potapova [a]

[a] *Federal State Autonomous Educatinal Institution of Higher Education "N.I. Pirogov Russian National Research Medical Universiy" of the Ministry of Health of the Russian Federation, Moscow, Russia*
[b] *State Research Center - Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency, Moscow, Russia*
ORCiD ID: Irina V. Vasilyeva https://orcid.org/0000-0001-6986-901X

Abstract. Despite the fact that many researchers and teachers reported that distance education can be equated with traditional face-to-face form education, the question of analyzing the quality of knowledge gained in distance education is open. This study was conducted on the basis of the Department of Medical Cybernetics and Informatics named after S.A. Gasparyan of Russian National Research Medical University. N.I. Pirogov for the period from September 1, 2021 to March 14, 2023 and included results of answers of two variance of test on the same topic. The responses of students who missed the lectures were not included in the processing. For 556 students with distance education, the lesson was held remotely using https://meet.google.com and for 846 students the lesson was performed in face-to-face form education. Students' answers to test tasks were collected using the Google form https://docs.google.com/forms/… The data base statistical assessment and statistical description were made in Microsoft Excel 2010 and IBM SPSS Statistics programs version 23. In this study, it was shown that the results of the learned material assessment for distance education and traditional face-to-face form education are statistically significantly different (p<0.001). The topic studied in face-to-face format was assimilated by 0.85 points better (the difference was five percent of the correct answers received).

Keywords. Education at a medical university, distance education, face-to-face form of education , assessment of learning

1. Introduction

From the second half of March 2020, students of the Federal State Autonomous Educational Institution of Higher Education "N.I. Pirogov Russian National Research Medical University" of the Ministry of Health of the Russian Federation, in order to

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[1] Irina V. Vasilyeva, , State Research Center - Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency Marshala Novikova Str. 23, Moscow, 123098, Russia. Email: iv001yt@gmail.com.

prevent the spread of a new corona virus infection (COVID-19), were transferred to distance learning [1, 2, 3]. Before all teachers of all full-time forms of education, the question arose of educational material preparation in a form suitable for using distance forms of education. Translation of traditional face-to-face forms of organization of the educational process (lectures, seminars, practical classes, industrial practices) and knowledge control (various tests, written, oral control and self-control, mutual control, seminar, role-playing game, business game, essay, home independent work, practical work , exam, abstract) demanded from the teacher the ability to use not only modern computer technologies, but also the ability to design the learning process for a distance format. As we know, the face-to-face learning process is not only a form of information transfer, but also a way of knowledge gaining, a socialization process, the formation of personal communicative properties, the establishment of social relationships for the student, as well as a way of obtaining actual feedback during the course of classes for the teacher in order to change learning process for the most effective conduct of the lesson [4, 5]. In the scientific literature there are data: on improvement [1, 5], on the deterioration of quality [2, 3] and an ambiguous answer when the learning process evaluation in medical universities [4, 6,7]. It is noted that the quality of education in a distance format is affected by the preparation of training materials, the process of organizing classes, the impossibility of conducting practical classes, and many other factors.

The question of the effective conduct of classes by assessing and of comparing the results of mastering educational material in face-to-face form of education and in distance education is open [6].The aim of this study was comparison of the results of educational material assimilation by senior students of a medical university in distance and face-to-face form education education.

2. Material and methods

This study was conducted on the basis of the Department of Medical Cybernetics and Informatics named after S.A. Gasparyan of Russian National Research Medical University. N.I. Pirogov. Data on the results of testing for the control of knowledge of 6th year students of medical, pediatric and foreign faculties were included. Students on the same day attended a lecture and a practical lesson on the topic: "Systems for supporting medical decision-making" as part of a cycle on e-Health. At the end of the lesson, testing was carried out on the day of the lesson for the present students, or during the week - for students who missed and retake the control test.

Table 1. Descriptive statistics of student responses to two variants of test.

Group	Variant of test	N	Score (m± δ)	Me, score	min;max, score	p
Answers of students' froup with distance education	17	488	13±1.6	13	7;17	<0.001
	19	68	14.1±2.0	14	8;18	0.003
Answers of students' group with face-to-face form education	17	288	13.5±1.7	14	7;16	<0.001
	19	558	15.7±1.7	15	9;19	<0.001
Total number of Answers			1402			

N -sample's size of group, m - average score of answers in the group, δ - standard deviation of mean, Me – median answer's score, min – minimum score of answer, max- maximum score of answer. P-p-value of Kolmagorova-Smirnova's test.

Since the lecture on this topic is a primary introductory educational material developed by the staff of the department, who are engaged in research and practical work in the field of "Systems for supporting medical decision-making" and set the standards for e-Health education in the Russian Federation, 90% of the questions were new. Two variants of test control were used for 17 and 19 questions test on the same topic. Questions for the survey were tasks of intermediate control on the topic of the new material studied, allowing assessing the correctness of the reproduction and understanding of definitions, rules and algorithms by students.

As a result of testing, 1711 responses were received for the period from September 1, 2021 to March 14, 2023. The students had little online learning experience (from 5 months to 1. 5 years). The analysis included the results of the answers of 1402 students who passed the test on the same day that the lecture and seminar were held with practical work. The responses of students who missed the lectures were not included in the processing. For 556 (39.7%) students with distance education, the lesson was held remotely using https://meet.google.com and 846 (60.3%) students in face-to-face form education. Students' answers to test tasks were collected using the Google form https://docs.google.com/forms/… The data base statistical assessment and statistical description were made in Microsoft Excel 2010 and IBM SPSS Statistics programs version 23 (test of Kolmagorova-Smirnova and Mann-Whitney).

3. Results

To compare the answers received in the form of students' education for two test variants on the same topic (for 17 and 19 questions) the answers were recalculated as the percentage of correct answers received for each student. It was considered that the student successfully completed the training on this topic, provided that the percentage of his correct answers was above 70%. The values of the percentage of correct answers were calculated for students' group with distance education and students' group with face-to-face form education, separately. Positive results were 478 (86.0) and 768 (90.8) cases, respectively. The average percentage of correct answer for students' group with distance education was 77.5%, for students' group with face-to-face form education was 81.4%. The half of the students' group with face-to-face form education got test results higher 78.9%, and in the students' group with distance education this value was less- 76.5%, there was also a statistically significant difference between the percentage of positive responses according to the Mann-Whitne's test, $p<0.001$.

Table 2. The results of the analysis of the received answers from students for two options

Group	Variant of test	N	Percentage of correct answer, value $(m \pm \delta, Me)$	Min;max, percentage of correct answer,	p1	Number of answer> 70%	p2
Answers of students' group with distance education	17+19	556	77.5±9.5;76.5	41.2;100	<0.001	478 (86.0%)	
							<0.001
Answers of students' group with face-to-face form education	17+19	846	81.4±9.5;78.9	41.1;100	<0.001	768 (90,8%)	

N -sample's size of group, m - average score of answers in the group, δ - standard deviation of mean, Me – median answer's score, p1-p-value of Kolmagorova-Smirnova's test, p2- p-value of Mann-Whitne's test.

4. Discussions

Despite the fact that many researchers and teachers advocate that distance education can be equated with traditional face-to-face form education, the question of analyzing the quality of knowledge gained in distance education is open [7]. In this study, it was shown that the results of the learned material assessment for distance education and traditional face-to-face form education are statistically significantly different ($p<0.001$). The topic studied in face-to-face format was assimilated by 0.85 points better (the difference was five percent of the correct answers received). Presumably, factors influencing outcomes between distance learning and program learning are creating moments related to class schedules, organized student activities, each student's work space, having a stable internet connection, and being able to ask questions to the teacher during class. We can assume that improving the quality of distance education can be achieved through the preliminary distribution of training materials to students for review, as well as checking the presence of control during the distance class and conducting an online current control during the lecture for observation and reproducibility of the material. Of course, in critical situations, for example, during quarantines for various reasons, the format of student education can be applicable in the absence of another and shows the assimilation of the material by more than 70% of students (86.00%). But still, when we talk about medicine, each of the patients would like to see a doctor with the best knowledge, skills and experience.

Accordingly, the traditional form of education with the classical lecture and practical seminar is preferable to a separate remote lesson, when students only listen to the lecture, independently, without the teacher's control, perform tasks, when the teacher does not have feedback of study's process and the involvement of students in the process, and there is no opportunity to direct their work to increase its effectiveness.

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