

ORIGINAL ARTICLE

IMPLEMENTATION OF DISTANCE LEARNING INTO EDUCATION OF THE DEPARTMENT OF MILITARY MEDICAL SERVICE ORGANIZATION AND MANAGEMENT OF THE UNIVERSITY OF DEFENCE UNDER THE COVID-19 PANDEMIC CONDITIONS

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Summary

As in everyday life, it was necessary to respond to the ongoing COVID-19 pandemic at the campus of the Faculty of Military Health Sciences, University of Defence, as well. The management of the faculty took a number of measures, but for the academic sphere, the most important of these was the restriction of contact teaching. The way, in which teaching and training would proceed in the limited conditions, has been delegated to the heads of departments and guarantors of individual subjects. The Department of Military Medical Service Organization and Management tested a teaching model which brought new knowledge that can be worked with in the future.

Key words: University of Defence; Faculty of Military Health Sciences; COVID-19; Teaching and training; MOODLE application; Distance learning

Introduction

The COVID-19 pandemic has fundamentally affected lives not only of the citizens of the Czech Republic, but also of the human society around the world. Its surprising rapid spread, easy human-to-human transmission, lack of vaccine or danger of severe course of the disease, all these led to the repressive measures of the government of the Czech Republic, the Ministry of Health and the Chief Hygienist of the Ministry of Defence (in relation to the ACR) in the spring 2020. The aim of the restrictions was primarily to slow down and stop the uncontrolled spread of the disease in society and to protect risk groups of the population.

A significant intervention in the activities of universities was, in particular, Government Resolution No. 102 of March 12, 2020, which prohibited the personal presence of students at collective forms of education. This resolution

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was then followed by a number of others. For example, Government Resolution No. 445 and 456 of April 23, which partially permitted practical training and examinations. Subsequently, during May and June, the measures were being released, when the teaching of groups of 15 people was allowed (Government Resolution No. 555 of May 18, extraordinary measure of the Ministry of Health of May 25, 2020, and extraordinary measure of the Ministry of Health of June 12, 2020). The situation at the Faculty of Military Health Sciences, University of Defence (FMHS UoD) was significantly affected by the employment of a large part of its students to reinforce the sanitary stations and the COVID-19 Central Management Team, which was subsequently reflected in the choice of teaching methods.

During the month of February, FMHS UoD in Hradec Králové started teaching in the summer semester 2019/2020 (1). At the turn of February and March, however, it was necessary to switch to the so-called distance method of teaching (2), in order to prevent the accumulation of large groups of students and teachers in a small space (see the previous overview of measures). Many educators thus faced a new challenge to prepare, organize and conduct the lessons without contact with the students (3), (4). The way to ensure the above mentioned was delegated to the heads of individual departments and especially to the guarantors of individual subjects. One of the recommendations of the FMHS UoD management was to use the MOODLE e-learning portal, which some teachers across the faculty have had the opportunity to use for a long time.

The Department of Military Medical Service Organization and Management (K-302) is a department of FMHS UoD (5) having a relatively broad focus of its professional pedagogical activities. Members of the department teach from purely military-professional subjects, such as "Field Training" or "Organization and Tactics of Medical Service", through subjects of a general nature, "Military History", "International Humanitarian Law", to narrowly profiled subjects, such as "Basics of Law", "Healthcare Management", "Basics of Research and Statistics" or "Medical Psychology". It is therefore clear that each guarantor of the subject could choose different ways of solving the situation. The advantage of K-302 without any doubts was that at least three members of the department have been actively using LMS (Learning Management System) MOODLE in their teaching for several years, and it was therefore logical that the use of this application will be recommended to other colleagues.

When conditions in connection with the COVID-19 epidemic changed, it was necessary to change also the usual and proven educational methods. Their suitability now needs to be assessed, especially in terms of meeting the educational goals. In order to enable an objective assessment of the quality of the educational process, it is appropriate to set its goals first. Various theories and taxonomies of educational goals are used for this purpose. An example is Bloom's theory (6), which divides goals into six levels: 1. knowledge, 2. comprehension, 3. application, 4. analysis, 5. synthesis, 6. evaluation. The educational goal then determines the choice of a teaching method. After completing the relevant part of the course, for example after completing the study of the subject at the university, it is possible and expedient to evaluate the achievement of the set educational goal.

K-302 and its reaction to the situation

According to the curricula, in the summer semester and in the summer training period (February to September 2020), K-302 was to teach a total of about 500 teaching hours in the Military Healthcare study programs (7) for General Medicine, Dentistry and Pharmacy, and approximately 100 teaching hours in the Medical Rescue study program. Only a small part of the total volume of teaching was taught in the planned way, especially in the month of February. Due to the unhappy forecasts of the development of the COVID-19 pandemic, the K-302 management, at the beginning of March, worked with the assumption that at least the summer semester teaching will be carried out in a distance manner. Measures were taken to guarantee that in case of impossibility to return to the normal way of teaching, the individual guarantors of the subjects will be prepared for the distance way of teaching in the whole range of their subjects. It was therefore necessary:

- start intensive training of K-302 academics in the use of LMS MOODLE (8);
- prepare and then fill LMS MOODLE with lectures and other study material so that the students will have access to all important information;
- to prepare a series of tests in LMS MOODLE, which would alternatively serve either as individual feedback for students (how they master the subject) or as a credit or exam test in the case the realization of the oral semester exam would not be possible.

The aim of the first step was to prepare materials for the study of individual subjects in the summer semester so that students would be able to meet all the requirements for granting the credit or semester exam. Due to the relatively good epidemiological situation, the form of oral examination of students was chosen for most subjects in the summer semester, only for the first-year students, an online test in LMS MOODLE was chosen for examination due to the quarantine of the whole grade.

After fulfilling the goal of the first step, which was to ensure teaching for the summer semester, K-302 academics began to fulfil the second step, which was to ensure teaching and especially training in the summer training period. The biggest problem was to ensure, if possible, an adequate replacement of field training for the 1st and 2nd grades of the FMHS UoD, as this training was cancelled by the order of the management of the FMHS UoD. It is obvious that practical training cannot be adequately replaced by mere theory, nevertheless an attempt was made to work out a part of the content of field training into a test, by completing of which the teacher got at least a rough idea of the level of the student's knowledge in the issue. However, this form cannot test the acquired skills. For this reason, the variant of the implementation of the field training, as it is usually implemented in normal teaching operation, was chosen for the 3rd grades of the FMHS UoD.

The third step was to prepare teaching in LMS MOODLE so that it completely can cover all subjects taught by K-302, i.e. also subjects taught in the winter semester. At present, twelve courses, which the K-302 guarantees according to the accreditation, are being developed or are already completed by the K-302 in the LMS MOODLE.

From the above mentioned, it is clear that distance learning brings both benefits and pitfalls (9). It is therefore necessary to find an optimally balanced solution strengthened by other elements and methods and their interconnection (10). In addition to the currently preferred use of LMS MOODLE, it was necessary to improve the way of communication, assignment of individual tasks and exercises and to apply a diametrically different social aspect. In many sources, the positive impact of distance learning and blended learning on students' outcomes is being discussed (11). In the conditions of K-302, a comparison of the results of five selected subjects taught by the department was performed. The results from the summer semester of the academic year 2018/2019, in which teaching was carried out in a standard way, and the results from the summer semester of the academic year 2019/2020 were compared. There was no significant difference between the results in this comparison. The reason may be many new and changed factors, including the fact that many students were actively involved in the fight against the pandemic and the time for their studies was significantly reduced. The transition to distance learning meant changes for educators, who were forced to start using new, hitherto unused methods.

Final mastery of subjects taught in the summer semester and in the summer training period, comparison of results in the academic year 2019/2020 and 2020/2021

Table 1. Comparative chart - overall evaluation for the subject

Evaluation	Summer semester 2019					Summer semester 2020				
	MH	BRS	FTII	FTIII	OTMS	MH	BRS	FTII	FTIII	OTMS
A	26	8	17	14	14	25	5	30	6	14
B	8	8	7	2	0	5	10	9	7	1
C	5	12	1	1	2	5	9	3	5	6
D	1	5	1	1	0	2	9	0	1	2
E	0	6	0	0	1	0	5	0	4	0
F	0	0	0	0	0	0	4	0	0	0
SUM	40	39	26	18	17	37	42	42	23	23
Mean evaluation	C	C	B	A	A	C	C	A	C	B

Military History (MH), Basics of Research and Statistics (BRS), Field Training II (FTII), Field Training III (FTIII) and Organization and Tactics of Medical Service (OTMS) were selected for the comparison of the study results

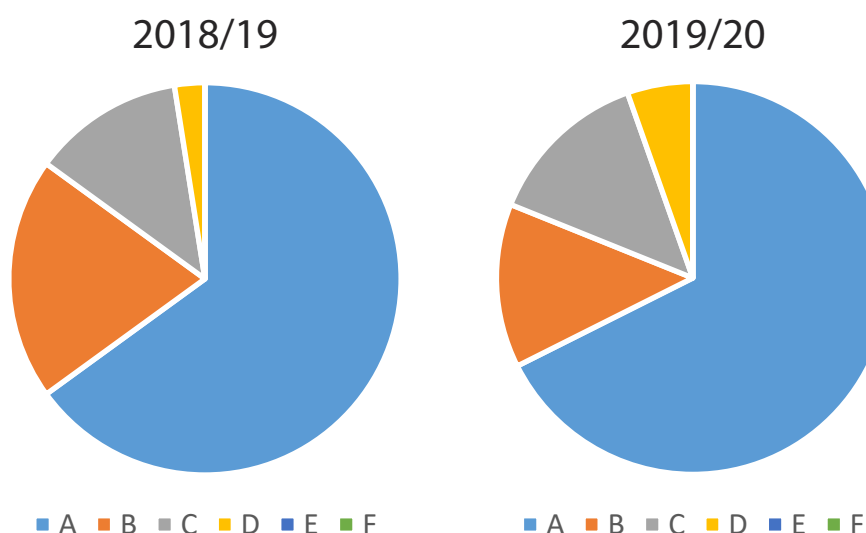
of the standard contact and the distance learning (table 1). These are groups of size from 17 to 42 students from different grades. In the case of the Basics of Research and Statistics, it is a combination of military and civilian students.

In the following tables (tables 2 - 6) and graphs (graphs 1 – 5), the relative frequency of student's evaluation in the monitored grades is given for each subject. With the help of the statistical program IBM SPSS Statistics, a comparison of final evaluations at the level of significance $\alpha = 0.05$ was carried out, which is given in the summary.

Military History

Table 2. Table of the relative frequencies

Evaluation	Summer semester 2018/2019	Summer semester 2019/2020
A	65	67,6
B	20	13,5
C	12,5	13,5
D	2,5	5,4
E	0	0
F	0	0

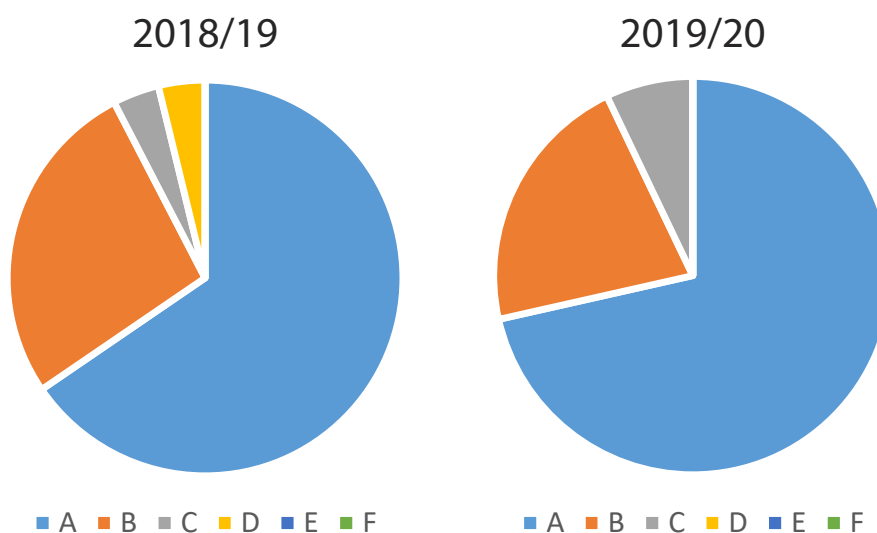


Graph 1. Circle graphs of the relative frequencies

Field Training II

Table 3. Table of the relative frequencies

Evaluation	Summer semester 2018/2019	Summer semester 2019/2020
A	65,4	71,4
B	26,9	21,4
C	3,8	7,1
D	3,8	0
E	0	0
F	0	0

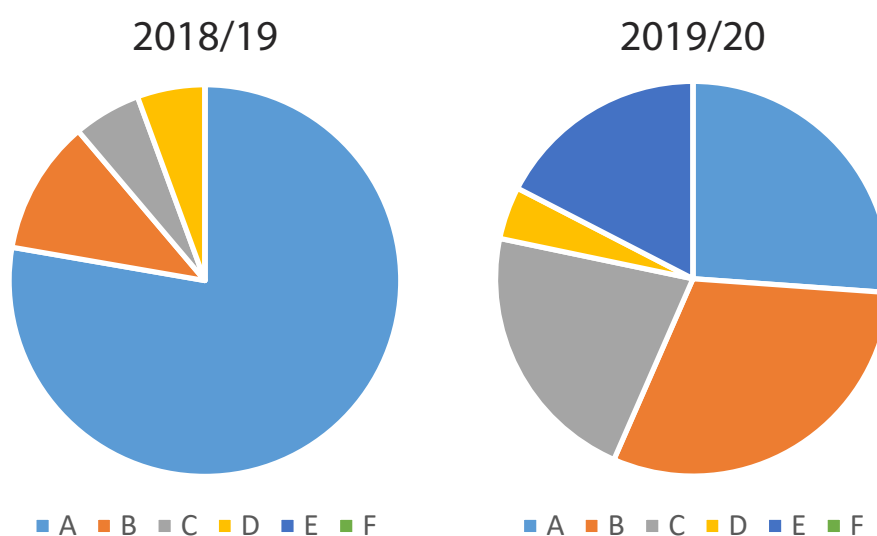


Graph 2. Circle graphs of the relative frequencies

Field Training III

Table 4. Table of the relative frequencies

Evaluation	Summer semester 2018/2019	Summer semester 2019/2020
A	77,8	26,1
B	11,1	30,4
C	5,6	21,7
D	5,6	4,3
E	0	17,4
F	0	0

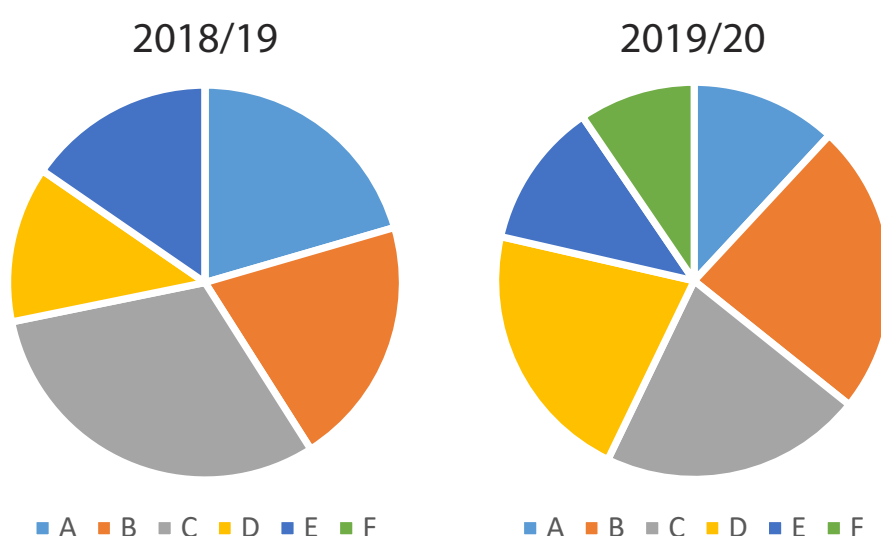


Graph 3. Circle graphs of the relative frequencies

Basics of Research and Statistics

Table 5. Table of the relative frequencies

Evaluation	Summer semester 2018/2019	Summer semester 2019/2020
A	20,5	11,9
B	20,5	23,8
C	30,8	21,4
D	12,8	21,4
E	15,4	11,9
F	0	9,5



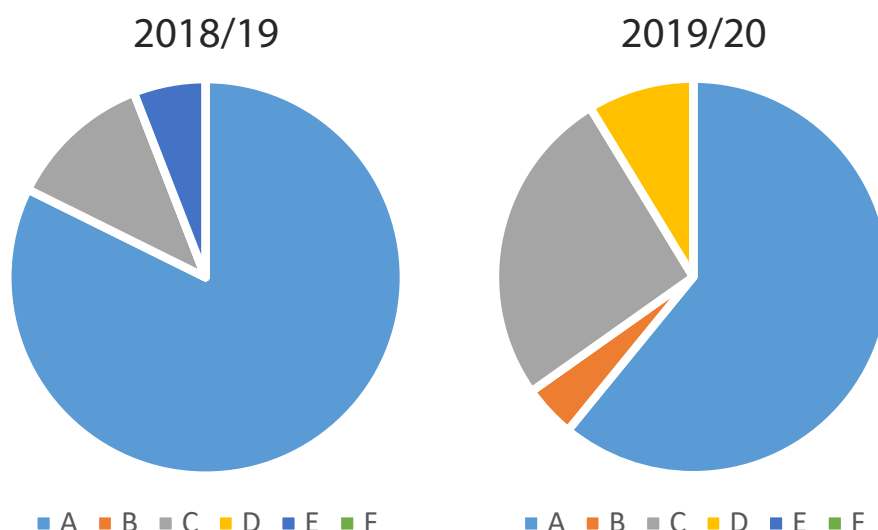
Graph 4. Circle graphs of the relative frequencies

Organization and Tactics of Medical Service

Table 6. Table of the relative frequencies

Evaluation	Summer semester 2018/2019	Summer semester 2019/2020
A	82,4	60,9
B	0	4,3
C	11,8	26,1
D	0	8,7
E	5,9	0
F	0	0

Although the spectrum of marks for the evaluation of subjects is not always the same and the comparison of the mean results for the subjects shows a rather slight deterioration, it was found that there is no statistically significant difference between the results in the monitored years for individual subjects. In the case of the subject Field Training III (table 4, graph 3), the difference in evaluation from the distribution of proportions is striking simply by comparing the circle graphs, which was confirmed by the statistical test.



Graph 5. Circle graphs of the relative frequencies

Teaching evaluation and feedback

Already, when planning adjustments and changes in teaching in this non-standard situation, the management of the department proceeded to find the optimal way to obtain feedback from students. An evaluation questionnaire was prepared, focusing on the qualitative usability of LMS MOODLE. The aims of the anonymous questionnaire were:

- elicit the students' opinion on the availability, usability and clarity of LMS MOODLE for their independent preparation in the subject
- elicit the students' opinion on the level of prepared lectures and study materials in LMS MOODLE and their practical use for their individual preparation in the given subject
- elicit the students' opinion on the clarity and the entered parameters of the test part
- give the students space for their personal expression, suggestions and improvements

Students of the 1st, 2nd and 3rd grades of the FMHS UoD master's study program filled in the anonymous questionnaires always for the given subject and answered the following questions:

1. Did LMS MOODLE help you to study the subject independently?
2. Were the study materials in the evaluated subject sufficient for you? What do you evaluate positively and what negatively?
3. How would you evaluate the test part? Was the test processed clearly, confusingly, questions were clear, misleading, time for processing the test sufficient, insufficient, time window for completing the test sufficient, insufficient... etc.?
4. What changes would you suggest in using LMS MOODLE for the next time?

As a research material, the anonymous evaluation questionnaires were used in the subjects "Organization and Tactics of Medical Service", "Field Training I", "Field Training II", "Field Training III" and in the subject "Military History". The return rate of the questionnaires reached the mean of 95%, which proves that the interest of students to express their opinion was high.

The evaluation of the questionnaire survey revealed the following information (generalization):

- ad 1) All respondents stated that LMS MOODLE helped them with their studies.

- ad 2) Respondents unanimously appreciated the immediate, fast and clear access to study materials in one place and at a time that suited the individual respondents. The sufficiency of study materials and the clarity of presentations were mostly positively evaluated. On the contrary, as a negative, some respondents mentioned too much information, which was offered to them by teachers in LMS MOODLE for study. Some respondents pointed to the absence of the scripts in the electronic form and to the modification of lectures which were prepared for contact teaching. The main reason was primarily the lack of comments which would be naturally given by the teacher during standard lectures.
- ad 3) Most of the respondents agreed that the test part had optimal difficulty, the questions were factual, the tests were clear. Some respondents pointed to the ambiguity of some questions, the lack of time to process the test, the inability to retrospectively check the test results or the absence of displaying the final mark after sending the test.
- ad 4) The vast majority of respondents evaluated teaching with the help of LMS MOODLE positively and would not change anything in the set method of teaching (12). Among the proposed modifications, the individuals recommended to: supply the study materials with a coherent text (scripts), create e-courses in the form of video lectures for more demanding topics, adapt the presentations more for independent study, in LMS MOODLE - provide access to materials of lower grades and thus enable a long-term access to single subjects across the grades.

Discussions and suggestions for practice

Given the assumption that the severity of the epidemiological situation and the associated restrictions and limitations of teaching will continue in the upcoming months, it is necessary to discuss the appropriate forms and methods of teaching in these difficult conditions. If LMS MOODLE was a logical solution at the beginning of the COVID-19 pandemic, in the future it will be necessary to focus on the real possibilities of distance learning. Based on the newly acquired experience of teaching in the period from February to September 2020 by pedagogical staff of K-302, it is appropriate, in relation to LMS MOODLE, to discuss the following:

- in certain situations, the LMS MOODLE is suitable for the implementation of theoretical teaching in the conditions of not only K-302, but also of the FMHS UoD as a whole
- formal arrangement of the environment (FMHS UoD - department - subject) is clear and easily accessible for all students of the FMHS UoD
- formal arrangement of individual subjects (study materials - recommended literature - test part) is clear and corresponds to students' expectations, however
- the structure of the subjects presented in LMS MOODLE should have a uniform template so that it is clear for students where to find the given type of information in the structure (e.g. categories: introduction, lectures, supplementary materials and tests)
- it is appropriate to modify the theoretical lectures (presentations), in a possible variant, to prevent the absence of teacher's comments (to supplement particular points with a written or spoken commentary, which the teachers accompany their standard lectures with)
- presentations in PowerPoint form (*.pptx) should be, in a possible variant, supplemented with spoken commentary, but unfortunately LMS MOODLE with its capacity does not allow sharing of learning materials with a large volume of data, so it is appropriate to combine it with cloud storage, using MS OneDrive.

Distance education has no tradition in the Czech Republic. Therefore, its introduction into the structure of education was relatively difficult and slow. Except of the several attempts at adult education institutions (1st Czech Correspondence School - ceased its activities in 1992, the Swiss Transfer Foundation - ceased its activities in 1993, German Correspondence Academy - ceased its activities in 1995, European School of Correspondence Courses, Academy Jan Amos Komenský) this form settled mainly at universities, especially at Brno University of Technology, Palacký University in Olomouc or the Technical University in Liberec. Nevertheless, the current critical period has shown that the distance teaching methods as basic elements of blended learning, where students acquire basic theoretical knowledge through self-study, and during full-time lessons with a teacher, they transform the information into a comprehensive form and consult any ambiguities, fall into the modern and effective education system (13).

Therefore, provided that the standard forms and methods of university education [1] continue to be limited due to the continuation of the COVID-19 pandemic, it will be necessary to use other distance forms of teaching. The following are available for discussion:

- use the so-called synchronous form of teaching, which requires an attendance schedule that will suit both the teacher and students - in the conditions of FMHS UoD, however, it is necessary to take into account the use of a large group of students in programs to combat COVID-19
- for the synchronous form of teaching, use the possibilities of online teaching with the help of the MS TEAMS application, which enables the conduct of online lectures
- use the so-called asynchronous form of teaching, where students can choose any time for their studies that suits them, but this form brings a longer period of time to deal with any questions and comments that will need to be addressed by correspondence
- in the case of the asynchronous form of study (14), take into account that students more or less determine the mode of their study, which is a great advantage, on the other hand, it puts high demands on will, personal discipline in performing and adhering to study tasks and at the same time it puts higher time demands on teachers themselves
- both of the above forms of teaching are feasible only under the conditions of quality hardware, which will allow not only online communication with a larger number of people at one time, but also the sharing of files of considerable size and the actual editing of teaching materials
- a system of asking questions through a public chat, where other students see both the questions of their colleagues and the answers of the teacher (15)
- for selected topics, use the possibility of creating an e-course in video format, which, however, comes across the technical possibilities of FMHS UoD
- computer simulations of a virtual environment can also be used as a progressive element, which, in an environment similar to computer games (16), allow to simulate the environment and situations that the student has to handle - due to their cost, however, it is not yet a module easily integrated into the e-learning system
- for online testing, such conditions must be met so that testing does not lose credibility - minimize the possibility of opening other applications on a PC when running the test, the possibility of access to the desktop of the tested person by the examiner, online camera transmission during the test (17)
- set up testing so that the student receives immediate feedback on the outcome of their exam

From the above mentioned topics for discussion, it is clear that a very important factor for the adequate implementation of distance learning is a progressive approach to this issue, computer literacy and the ability to use modern computer technology by teachers themselves.

The study limits

A number of circumstances affected the situation. The main limiting factor was time. Rapid response and adaptation to the situation were necessary. All study materials and presentations were prepared for the classical style of teaching, and the concept of online education needed another type of teaching approach. The next limiting factor was the weak experience with software, chosen for use. All staff members were forced to quickly absorb a huge amount of information about using the program's extended features and solve problems associated with their implementation. The last significant limiting factor was a motivation for using this solution of teaching. The motivation concerned both teachers and students. The new situation brought new things and potential problems associated with online learning which was necessary to overcome. In accordance with (14) groups of students were organized for asynchronous learning and new forms of information transfer have been implemented, tailored to the topics.

Conclusion

There is no doubt that the pandemic situation in the Czech Republic is not going to improve in the upcoming months. Therefore, it is necessary and essential to respond to the situation. In the conditions of FMHS UoD in Hradec Králové, a possible variant of the solution is the use of LMS MOODLE in conjunction with MS TEAMS, which gives both the academic staff and the students the opportunity to effectively use resources and time

to implement teaching in conditions of this type of restriction. A total of six subjects were registered for K-302 before the pandemic, which LMS MOODLE teachers actively used for teaching. After the rise of the COVID-19 pandemic, the number of subjects in LMS MOODLE for K-302 increased to twelve to cover all subjects taught by the department. The teachers also quickly adapted to online broadcasts using MS TEAMS for lectures and consultations.

The respondents agree that the use of LMS MOODLE is a possible option for resolving the situation. The application offers the space for placing all important information carriers and test parts in one place and in optimal accessibility for all participants in education. For this reason, it is not necessary to use MS TEAMS to transfer tasks and files. At the same time, across the academic environment of the department, there is a consensus that despite all the shortcomings and disadvantages of the lecture as a method of communication, LMS MOODLE is not able to replace the personal approach of the teacher standing in front of the auditorium and explaining the topic. This agreement of opinions is supported by the final evaluation of the students across the grades who passed the oral exam in the observed time. The students were able to repeat the read information relatively accurately, but many of the contexts, which the teacher describes or emphasizes during contact teaching, remained misunderstood or not given the appropriate attention. The aim of teaching - understanding the issue - was therefore only partially fulfilled. It goes without saying that practical training in field conditions is an irreplaceable part of selected subjects and without completing it, students rely only on theory. The situation can be solved in the form of individual seminars.

The respondents agreed that limiting distance learning only to LMS MOODLE and its possibilities would not be sufficient in terms of teaching quality. It is necessary to gradually integrate into the teaching other possible ways of transmitting professional information, for example in the form of spoken commentary in PowerPoint presentations, video recordings of selected lectures, the use of MS TEAMS for online teaching, creating an e-course in video format and more. The results of the comparison of the students' study results in the selected subjects showed, with one exception, that there was no statistically significant deterioration. It is assumed that by improving and supplementing the above-mentioned options in distance learning, it will also lead to improved study results. The availability of study materials in electronic form, at a time when the teaching is again conducted in the standard contact way, will be a welcome support for the students in their studies.

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Conflict of Interest

The author declares that he has no conflicts of interest regarding the publication of this article.

Adherence to Ethical Standards

This article does not contain any studies involving animals performed by any of the authors. This article does not contain any studies involving human participants performed by any of the authors.

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