Evaluation of the Maritime Higher Education didactic support during the coronavirus pandemic. Case Study

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Abstract

The unforeseen appearance of the pandemic situation imposed the interruption of face-to-face courses in all educational institutions in Romania, and maintaining the educational quality standards in these conditions was a real challenge. Thus, the ensuring of education support is a determining factor in carrying out online teaching activities. The teaching support in e-learning involves the cumulative implementation of several factors, as follows: stable and high-speed internet connection, high-performance hardware and communication software tools, digital teaching and learning resources for each discipline in the curriculum, technical and pedagogical support. The case study presented aims to identify the impact produced on the maritime higher education by the sudden transition from the classical teaching and assessment system to the online and distance hybrid one. The analysis is done from the perspective of ensuring teaching support, considering the fact that, compared with the conventional methods of teaching and evaluation, online education requires a more elaborate didactic and diversified technology. The evaluative and transversal research was carried out on a sample of 300 students and 27 professors from the "Mircea cel Bătrân" Naval Academy by applying online questionnaires. For the analysis of the obtained data, statistical analysis techniques and tools were used. The difficulties encountered in carrying out the teaching activities are analysed and the identified and applied improvement solutions are presented.

Keywords: E-learning, Didactic support, Statistical analysis, Teaching, Assessment

1. Introduction

Starting with March 11, 2020, following the appearance of the coronavirus pandemic, the face-to-face courses in all Romanian educational institutions were suspended. In order to ensure the continuity of education, it was imperative that the education system to quickly shift to online and distance education.

The transition from the classical education system to the online one was unpredictable, the education system was faced with a challenge of a magnitude that has never been seen before being forced to continue the teaching activities online. Therefore, it was necessary to quickly find solutions to adapt the education system to the real situation, both in terms of the reorganization of curricula and of the didactic support assured in terms of resources, tools and of e-learning communication platforms necessary for an education that takes place in virtual space. The didactic support is an essential factor in online education fulfilment.

The article presents the research carried out in order to identify the impact on maritime higher education, by moving from the classical teaching system to the online and distance teaching and assessment system. The difficulties encountered in carrying out teaching activities from the perspective of providing didactic support were analysed and solutions to improve it were identified, in order to be implemented within the "Mircea cel Bătrân" Naval Academy (MBNA), as well as at the maritime higher education level.

MBNA is a Romanian maritime higher education institution internationally recognized. The educational offer includes both academic programs (undergraduate and postgraduate) and training programs in the field of navigation, naval electro-mechanics, electrical engineering, port management and operations, naval equipment and automation, sustainable development and the

marine environment. The educational and training programs are fully accredited by the national and international authorities and are organized in compliance with the international rules in the framework of ISO 9001/2015 standards (www.anmb.ro).

2. Research methodology

The didactic support evaluation of the maritime higher education within MBNA, during the development of online and distance education, it was done by choosing a method of evaluative and transversal research.

The target group of the research is represented by the 1793 students and 58 professors from the MBNA.

The research was conducted based on the answers of 300 students from all undergraduate and master's degree programs and 27 professors, from the two faculties belonging to MBNA. The questionnaires were anonymous, and the survey was realized online, between 25.05-16.06.2020.

The sample from the study is representative of the target group population, with a permissible error of +/- 5%, for a confidence level of 95%; data validation was performed by identifying the minimum sample calculation based on the population under research (Pomohaci and Pârlea, 2008).

For the data analysis, the following statistical techniques were used:

- Reporting the percentages where it has followed the presentation data sample and/or the frequency of use applications.
- The average and the standard deviation (variability of the data within the sample of the respondents) and the minimum and maximum scales Likert considered where it was intended to report the intensity with which respondents perceive the effects of the current situation of the difficulties in teaching, from the point of view of ensuring the didactic support (Cardinal and Aitken, 2006).
- Simple ANOVA analysis of variance, F test, and Bonferroni t-test to compare the data of the two categories of respondents in the study. In this case, the following data were reported: the number of respondents, the average, significance threshold, the value of the F test, and the meaning of the differences between the averages of the two compared categories (students and professors) (Cardinal and Aitken, 2006).

3. Results of the study

Compared to the classical teaching and assessment methods, the online education form requires a much more elaborate and diversified technology based didactic support.

Therefore, for the realization of the online education, from the point of view of ensuring the didactic support, the cumulative fulfilment of the following factors is necessary:

- Stable and high-speed internet connection;
- Existence of high-performance hardware tools;
- Existence of stable communication software tools;
- Providing digital teaching resources for each discipline in the curriculum;
- Providing technical and didactic support at the institutional level.

3.1 Internet connection

The internet connection is essential for online and distance education (Stan, 2014). The study analysed the existing internet connection at the institutional level used by professors, as well as the one at home, used by both categories of respondents, as both locations were used for online education. The analysis of data presented below has been found mostly the existence of a permanent connection, uninterrupted and high speed for both respondents (74.07% - professors, 59.8% - students).
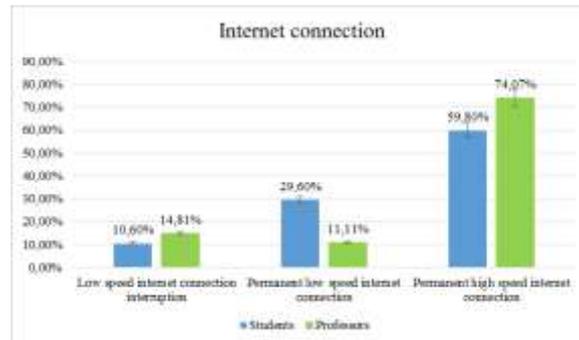
Figure 19. Percentage distribution of respondents according to the internet connection

3.2 Hardware tools used in online education

The hardware tools used for video communication that are available by professors and students are computer, tablet, and phone. Among them, due to hardware performance and ease of use of software tools, the computer is the most used. During the study, the degree of use of these tools was analysed, the data obtained are presented as a percentage in Figure 20.

The study reveals that all professors use the computer in the online education process and, in parallel, the telephone, which is used to a lesser extent (14.8%). At the same time, the student respondents use both the computer, in a percentage of 87.7%, and, less (58.8%), the telephone. Also, it can be observed the reduced use of the tablet by the respondents (3.7% of professors and 6% of students).

Although the institution provided fixed computing units in specially designed spaces, they could not be used for online courses (videoconferencing) due to inadequate places for simultaneous teaching of online courses, the constraints of mobility, and the social distancing of professors, imposed by the pandemic situation. Consequently, professors used personal portable devices (laptop, telephone) and high-speed internet connections (personal modems belonging to mobile telephony services, mobile phone hotspot, etc.).
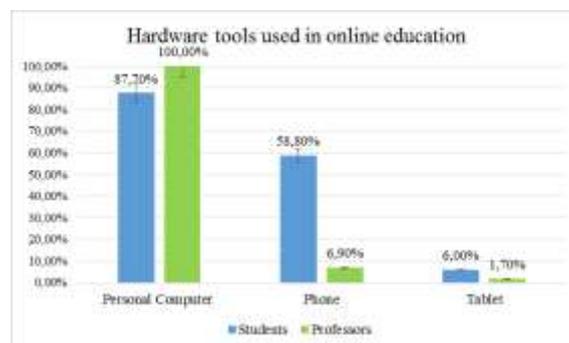

Figure 20. Hardware tools used in online education

3.3 Communication software tools used for online education

Digital technology has greatly facilitated the continuation of the online and distance learning activities during the interruption of face-to-face courses. To support these activities, professors and students used various software tools specific to synchronous and asynchronous online communication, such as Zoom, Google Meets, Cisco Meets, Whatsapp, Facebook messenger,

email, telephony, etc. Furthermore, in the MBNA there are developed e-learning and e-mailing platforms for achieving institutional communication between professors and students.

The study analysed the degree of use of these digital tools, as well as the difficulties encountered in how to use them during online and distance learning, in relation to the years of study. The analysed data are presented in Table 9; the averages on a Likert scale from 1 to 4 were used (1-never, 2- once a week or less, 3- once every few days, 4 - daily).

The comparative analysis performed using the Bonferroni t-test, concluding:

- the institutional e-learning platform was almost daily used by all respondents (79.9% of students and 66.7% of professors) - Likert scale average – 3.736;
- the email was used for communication between professors and students, almost daily (Likert scale average of 3.506),. The percentage analysis shows a higher use by professors, given that 77.8% of them used this communication system daily, compared to students who used this mode of communication in 58.5%.
- the institutional e-learning platform was supplemented by the free of charge audio-video communication platforms (Zoom, Google Meets, Cisco Meets) with a Likert scale average of 3.067, namely almost once every few days of use, as follows: 42.1% of students daily and 36.5% once every few days, while professors used it in a proportion of 25.9% daily and 25.9% every few days).
- the communication platforms (Facebook - messenger, Whatsapp, etc.) for audio and chat communication were used (average of 2.991, once every few).

Significant comparisons (differences in averages greater than 0.5) in the use of other videoconferencing platforms relative to other respondents, were identified to students of third-year. This fact can be explained due to the large share of specialized disciplines studied by this category of students, which determines the e-learning platform to support very high data traffic due to the use of digital content and open educational resources. Correspondingly, the professors used the least other e-learning platforms (an average of 2.519), the explanation being that they were familiar with the use of the institutional platform and also not all professors used digital data high data traffic required as educational resources in the teaching process. (average of 2.556).

Software tools	Average	Standard deviation	Students N = 300				Professors	F	Significant differences *
			Year I N=86	Year II N=61	Year III N=40	Year IV N=112	P N=27		
Institutional e-learning platform	3.736	0.564	3.820	3.767	3.732	3.630	3.625	1.032	No
E-mail	3.506	0.674	3.477	3.508	3.575	3.438	3.778	1.544	No
Other e-learning platforms	3.067	0.977	3.151	2.885	3.450	3.098	2.519	4.568	III>II; III > P I < CD
Audio and chat communication	2.991	1.094	3.023	2.984	2.975	2.920	3.222	0.439	No
Open educational resources and digital content	3.0	0.983	2.	3.	3.	3.1	2.556	5.0	III > P; I > P II > I; IV > P

		52		814	295	325	25		83	

Table 9. Software tools used for online and distance learning

3.4 Digital teaching resources used in online education

Due to the fact that the form of online and distance learning previously existed at MBNA for certain study programs, which required the creation of digital resources by professors, these resources were later developed for all classical study programs. Therefore, the impact of the pandemic situation on the existence of digital resources necessary for online education was not a major one, which emerges from the answers given by both categories of respondents confirming that the courses in electronic format existed on the e-learning platform of the institution at starting online and distance learning. Moreover, for the individual study, the students used the online library in a percentage of 62.2%, virtual laboratories in a percentage of 51.8%, simulations on professional platforms in the field of specialization in a percentage of 51.2%, as well as educational software in a percentage of 54.5%. Professors used, in addition to courses in digital format, virtual laboratories (37%), simulations on professional platforms in a percentage (30%), educational software (41%), and video educational materials (56%).

3.5 Support and guidance during online education

At the level of each faculty, a support group consisting of professors and IT specialists was set up. The support objectives focused on the technical and didactic aspects and, in particular, on the organization and development of teaching activities in the online education environment. The respondents emphasise that most benefited from the edification received from this support group (84.5% of students and 81.5% of professors), but also from their colleagues (26.1 % of students and 37% of professors).
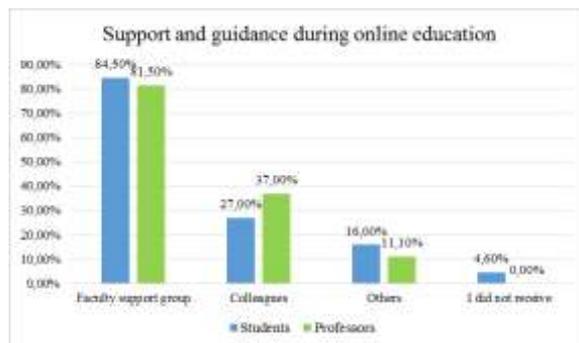
Figure 21. The relevance of support and guidance in online teaching activities

3.6 Difficulties in ensuring the support of teaching activities

During the online and distance teaching activities, both categories of respondents faced different challenges due to the lack of information on the time allocated perspective and to the very special regime of further online educational activities. The analysis is performed both according to the answers of the student respondents considered by years of study and to the internet connection, they benefited from. These difficulties were not analysed from the perspective of the use of technical devices by the respondents, as most of them used the computer as a hardware device during the teaching activities. The data analysis results obtained are presented in

Table 10. In the statistical analysis of the data, the following averages on a Likert scale from 1 to 4 were used: 1 - never; 2 - rarely; 3 - partially; 4 - frequently.

The study reveals that, during the period in which online and distance learning and teaching took place, both categories of respondents encountered minor difficulties on the following issues: the of educational content in digital format, the lack of time for understanding and proper use of digital tools and resources, the planning of the online teaching activities, lack of habit of carrying out teaching activities using new technologies. Significant differences highlighted by the Bonferroni comparison test (Table 10) are between the third-year student respondents and other respondents on the digital skills of using new technologies, how to use them for the management of teaching activities in the online education environment and how to plan online teaching activities.

Regarding the time required for the understanding and proper use of digital tools and resources, it is noted that the fourth year students adapted the most to them, as a result of the experience gained during university studies.

Software tools	Average	Standard deviation	Students N = 300				Professors P N=27	F	Significant differences *
			Year I N =86	Year II N =61	Year III N =40	Year IV N= 112			
Technical difficulties	2.03 7	0.970	2. 186	2. 049	2. 575	1.7 41	1.963	6.67 2	III >IV III > CD III > II
Lack of educational content in digital format	1.60 7	0.841	1. 605	1. 623	1. 850	1.4 46	1.889	2.67 5	No
Lack of time for understanding and proper use of digital tools and resources	1.80 4	0.947	1. 988	1. 869	2. 075	1.5 63	1.667	3.79 5	III > IV I > IV
Planning of the online teaching activities	1.72 7	0.916	1. 674	1. 623	2. 175	1.6 61	1.741	2.87 2	III > II III > IV III > I
Lack of habit of carrying out teaching activities using new technologies	1.72 1	0.937	1. 826	1. 557	1. 950	1.5 80	2.000	2.60 8	Nou

* Significant differences identified using the Bonferroni t test.

Table 10. Support difficulties in carrying out teaching activities related to the respondents

3. Conclusions

The study was conducted at an interval of two months from starting the transition from classical to online education, including both teaching and evaluation activities, which allowed, with specific limits, to obtain results based on practice. Normally, such an evaluative research would have required a certain chronological detachment, for the respondents' opinions to be outlined on the basis of long experience. The analysis on the didactic activities support consisted

in the evaluation of the logistic infrastructure (internet connection, hardware tools, software tools, didactic resources), of the technical and didactic support provided to the respondents, as well as of the difficulties encountered by both categories of respondents.

The research highlight that the maritime higher education system has some key points in terms of providing teaching support during online education activities, as follows:

- The specificity of maritime higher education imposes the existence of its own e-learning platform able to fully cover the specific requirements for the optimal development of online and distance teaching activities, both in terms of videoconferencing and the increasing of the digital database necessary for the didactic activities progress.
- The existence of an institutional high-speed wireless internet connection would allow the fulfilment of the constraints imposed by the pandemic, the increase of professors' mobility, and different appropriate spaces for online courses.
- Limits on student access to digital teaching resources (10%) because they don't a proper internet connection that allows high data traffic and their participation in video conferencing courses.
- Need for online and distance access to simulators specific to maritime higher education that means the acquisition and implementation of the new software (Stan, 2014).
- Although the study shows that both students and teachers have the desired digital skills to use hardware tools to carry out the activities in the virtual education environment, there is essential to develop specific skills for online and distance education, especially for teachers to accomplish necessary digital resources for the management and use of software for the development of interactive digital didactic materials for teaching, learning, and evaluation.
- It is important to develop digital teaching resources for each discipline (virtual laboratories, simulations, etc.) and to make available high-performance mobile hardware devices (laptop, tablet) for professors in order to increase their mobility.

Furthermore, during the online and distance activities, the study highlighted the following positive aspects specific to maritime higher education:

- Quality technical and didactic institutional support offered to both students and professors throughout the period of online and distance teaching activities.
- Efficient collaboration between the students and professors in order to solve the teaching tasks received online.
- Online teaching activities have been properly planned.

Therefore, in the conditions of the limitations imposed by the pandemic situation, for the good conditions new academic year progress, it is imperative maritime higher education matching to the existing situation and flattening the provided teaching support deficiencies so as not to affect the quality of education.

Consequently, the didactic support represents a determining factor in online and distance education activities to quality standards imposed by national and international law, on initial and continuing training of naval officers.

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