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The Evaluation of E-Learning System During the COVID-19 Pandemic from the Students' Perspective

Omar Salem and Marietta KISS
University of Debrecen, Debrecen, Hungary

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Corresponding Author:
Omar Salem
University of Debrecen, Debrecen, Hungary

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Abstract: The COVID-19 pandemic has affected all aspects of life including the education sector, it enforced the communities to follow precautionary measures to reduce the spreading of the virus. As a result, the education system has turned from its usual method toward online learning. In this study, the E-learning system at the University of Debrecen from the student's perspective was evaluated. First, a pilot study was conducted to assess the reliability and validity of the survey questionnaire. Then, a self-administered questionnaire was used by the researchers to collect data from 127 students studying at University of Debrecen in order to evaluate the E-learning system. The results showed that the level of student's opinions about the E-learning system during the COVID-19 pandemic is moderate with the average mean of all items equal 2.83 and a standard deviation equal 0.43 in a 5 point scale.

INTRODUCTION

In spite of huge progress in the health sector and other fields, the 21st century couldn't prevent the appearance of new infectious diseases such as the one that begun in Wuhan city, Hubei province, China in December 2019 and then spread to other countries. The disease was officially named Coronavirus Disease 2019 (COVID 19) by the World Health Organization in February 2020[1]. The pandemic of coronavirus is an ongoing disease and expanding quickly worldwide[2]; it has also swiftly changed people's life all over the world, including Hungary[3].

By the beginning of March 2020 (4th March), the first two cases of COVID-19 have been confirmed in Hungary[4]. Afterward, the Hungarian government announced the emergency case in the country until 18th June. Next, by the end of July, the number of infected cases in Hungary reached 4,505 with a number of 596 total deaths, 556 active cases and 3,353 recovered[5]. Until 31th of December 2020, the death toll in Hungary has risen to 9,537 while the recovery people number has reached 150,102 case[6].

COVID-19 had a significant influence on the educational field, where governments around the world imposed intensive restrictions including social distancing, psychological distancing, avoiding complex activities and wearing masks trying to reduce the spreading of the virus[7,8]. The pandemic led the educational institutions to turn the education process from the traditional method into online learning as a response to the recommendations of UNESCO[9]. Therefore, all universities in Hungary followed the new trend of education with the necessary equipment required to embark on the E-learning process.

This change from the conventional style of education to the online method is surely not a simple and easy process[10]. Almost all participants in E-learning (lecturers, students, parents and community) find many obstacles to adapt to the new system of education, these drawbacks related to the skills needed, technology, time, knowledge, habits, infrastructure and so on. However, what COVID-19 imposed in the world, all parties should struggle to overcome the barriers and problems over time[3].

The objectives of the study are to get feedback from students who learned and are learning online through taking online classes during the COVID-19 pandemic in one of the biggest Hungarian universities which is University of Debrecen (UD). Besides, the study is looking forward to discovering the differences in the respondent's opinions related to demographic variables such as gender, age, level of study, year of study, nationality and faculty. In addition, the study aims at providing recommendations for the decision-makers primarily at University of Debrecen to improve and develop the E-learning process; however, the results might be useful for other higher education institutions, too.

There are many studies that highlighted the aspect of the E-learning system during the COVID-19 pandemic. The study of Mulla and others evaluated the response of their faculty members toward the challenge during the COVID-19 crisis while Aboagye *et al*.[11] explored the challenges that students faced when the educational system transformed from a traditional method to an online system. Besides, a study that applied in different universities in Malaysia discussed the differences of male and female students' perspectives towards E-learning portals' accessibility[12]. Prasetya *et al*.[13] showed in their study the satisfaction level of students using End-User Computing Satisfaction, the overall analysis outcomes revealed that the students were satisfied with the e-learning education in vocational learning media. Similarly, Elhadary *et al*.[14] revealed that both teachers (48.8%) and students (65.0%) are satisfied with the used E-learning platform. On the other hand, 77% students have negative perceptions towards E-learning process[15]. Furthermore, the study conducted in higher education institutions in three countries (Turkish Republic of Northern Cyprus, Qatar and Pakistan) concluded that face to face communication with the course instructor is required and convinced the belief that online learning is not the replacement of face to face learning[16]. Based on previous research, to enhance the quality of learning results, among others, it is essential to promote the internet network infrastructures' quality[3].

MATERIALS AND METHODS

Data collection methodology: In order to collect the needed data for this research, first, we used secondary resources such as books, journals, statistics and web pages. In addition to gather data that are not available in secondary resources, a primary research was conducted. The researchers conducted an online survey to explore the student's opinions about the e-learning system during the COVID-19 pandemic at University of Debrecen among students from different faculties. A self-administered questionnaire was developed by the researchers in order to gather data from the sample containing the following sections: questions regarding the student's opinions of the E-learning system and demographic information. The questionnaire was anonymous to ensure the data reliability and confidentiality, it consisted of 22 questions using 5 point Likert scales and one opened question asking about adding comments and recommendations by the respondent. Since, 7 questions have a negative trend, they have been reversed in statistical analysis. The questionnaire was distributed to the research sample online by Whatsapp and Facebook groups in December 2020 and January 2021.

A pilot survey was conducted firstly in December 2020 until the respondent's number reached thirty. The purpose of the pilot study was to test and prove that the questionnaire questions are clear to be answered in a way that helps to achieve the aims of the study. The questionnaire was then adopted based on the results of the pilot study.

Population and sampling: The research population includes students from University of Debrecen from different faculties, i.e., 29,045 students. We selected a convenience sample; thus, it is not representative of the research population.

Sample composition: A total of 127 students from the University of Debrecen from different faculties have participated in the survey. Table 1 shows that slight majority (55.9%) of the sample are male and majority (44.9%) belong to the 18-22 years of age range. Almost half of the respondents study at vocational training or bachelor level, a little more than one quarter study at traditional 5-year and master level and one quarter at postgraduate and PhD level. Most respondents (31.5%) study at the Faculty of Economics and Business and almost half of the sample study at the second year. It can also be observed that the participation of international students is higher than that of the Hungarian students, around three-quarters of the sample are international students, while just a quarter of the sample is Hungarian students. This can be attributed to the fact that the questionnaire was in English and it was distributed in English-language online groups.

Table 1: Sample and population composition based on demographic variables

Variables/Demographic variables	Sample		UDa (%)
	Frequency	Percentage	
Gender			
Male	71	55.9	
Female	56	44.1	
Age (Yeras)			
18-22	57	44.9	
23-27	39	30.7	
28-32	20	15.7	
33 and above	11	8.7	
Level of study			
Vocational training and Bachelor	58	45.7	58.5
Traditional 5-year and Master	37	29.1	33.2
Postgraduate and PhD	32	25.2	7.1
Faculty			
Faculty of Economics and Business	40	31.5	17.7
Faculty of Engineering	21	16.5	11.6
Faculty of Medicine	21	16.5	12.5
Faculty of Science and Technology	14	11.0	9.2
Faculty of Informatics	12	9.4	7.6
Faculty of Public Health	6	4.7	4.5
Faculty of Humanities	6	4.7	10.5
Faculty of Pharmacy	2	1.6	1.8
Faculty of Child and Adult Education	2	1.6	6.2
Faculty of Agricultural and Food Sciences and Environmental Management	2	1.6	5.4
Faculty of Law	1	0.8	5.6
Nationality			
International student	95	74.8	22.2
Hungarian student	32	25.2	77.8
Years of study			
First	38	29.9	
Second	55	43.3	
Third	20	15.7	
Fourth	9	7.1	
Fifth	4	3.1	
Sixth	1	0.8	

Authors' own compilation based on their survey research (2020); [a] Source of University of Debrecen data: UD in 2021. Headcount data on 15 October 2020. Level of study: the remaining 1.2% belongs to "other"; Faculty: excluding PhD students; the remaining 7.4% belongs to 3 other faculties of UD

Table 2: The correlation coefficient between each item in the questionnaire and the whole items

Pearson correlation coefficient	p-values	Pearson correlation coefficient	p-values	Pearson correlation coefficient	p-values
0.428*	0.018	0.652**	0.001	0.553**	0.002
0.541**	0.002	0.657**	0.001	0.859**	0.001
0.471**	0.009	0.437*	0.016	0.788**	0.001
0.696**	0.001	0.659**	0.001	0.629**	0.001
0.413*	0.023	0.606**	0.001	0.377*	0.040
0.705**	0.001	0.797**	0.001	0.519**	0.003
0.452*	0.012	0.618**	0.001		
0.663**	0.001	0.755**	0.001		

*significant at 5%; **significant at 1%

Validity and reliability: We can define the validity of an instrument as a determination of the extent to which the instrument actually reflects the abstract construct being examined[17].

Internal consistency (content validity) of the questionnaire is measured by a scouting sample which consisted of thirty respondents, through measuring the correlation coefficients between each item in the questionnaire and the whole items. Table 2 shows that the correlation coefficients of these items are significant at $\alpha = 0.01$ or $\alpha = 0.05$, thus, it can be said that the items of questionnaire are consistent and valid to measure what it was set for.

The test was repeated to the same sample of people on two occasions and then the scores obtained were compared by computing a reliability coefficient. For the most purposes reliability coefficient above 0.70 are considered satisfactory[18]. The Cronbach's alpha coefficient and Half Split Method through the SPSS software have been used to measure the reliability.

Half split method and Cronbach's alpha method: the half split method depends on finding Pearson correlation coefficient between the means of odd rank questions and even rank questions of each field of the questionnaire. Then, correcting the Pearson correlation coefficients can be done by using Spearman Brown correlation coefficient of correction[18]. The corrected correlation coefficient (consistency coefficient) is computed according to the following equation[19]:

$$\text{Consistency coefficient} = 2r/(r+1)$$

where, r is the Pearson correlation coefficient (in this case, 0.647). The normal range of corrected correlation coefficient is between 0.0 and +1.0. The reliability for all items based on Spearman-Brown coefficient equals 0.786. The Cronbach's alpha was also calculated and reliability for all items based on this equals 0.791 which is higher than the required 0.70. This means that the result ensures high reliability of the questionnaire.

Tests of normality: The results of both tests of normality (Kolmogorov-Smirnov statistic = 0.065, df = 127, p = 0.200; Shapiro-Wilk statistic = 0.992, df = 127, p = 0.674) denotes that data follows the normal distribution and so parametric tests must be used.

RESULTS AND DISCUSSION

The research question of this study was the following: what is the student's opinion about the E-learning system during the COVID-19 pandemic at the University of Debrecen. To answer this question we calculated the mean and standard deviation of evaluations of each question. The results are shown in Table 3.

The results show that the mean of the items (reversed items taken into consideration) ranges between 1.83 and 3.70 and in general, the average mean of all items equals 2.83 with a standard deviation equals 0.43. About 80% of respondents agreed with the statement that face to face learning system is more interactive than the E-learning system and it is an obvious evidence of the inability of the E-learning system to become completely adopted as a substitute of the traditional system. Moreover, the self-motivation of students is necessary for the education process, about 66% of students suffer from the lack of self-motivation in the E-learning system. Approximately, 66% of respondents support continuing the E-learning system when the pandemic ends for some elective course, this opinion enhances the idea that the E-learning system could be a supporter method for the usual learning system developing into hybrid or blended learning models already identified before the current pandemic[20]. The evaluation of students was also high for the user-friendliness of the platform, providing the necessary technical support and providing online portals to access the textbooks and reference materials, the means of them were 3.70, 3.53 and 3.47, respectively.

Providing alternative solutions in the event of a problem during the exams is significantly important for students, about 50% of respondents agreed that the university provides that type of support. At the same time, 38.5% of the students faced technical problems during taking exams online and when browsing the university website as well. On the other hand, respondents gave a negative feedback related to the following statements: the E-learning provides an interactive environment like face-to-face classes, the home environment gives the

Table 3: The evaluation of e-learning system during the COVID-19 pandemic from the students' perspective (N = 127)

Items	Mean	SD	Resonance level
The face to face learning is more interacting than E-learning (R)	4.17	1.09	Agree
I support recording live online lectures and uploading them on the university website (R)	4.06	1.08	Agree
I prefer the university to provide me with emergency/crisis support outside of business hours (R)	3.86	0.94	Agree
The E-learning platform is user-friendly to install and operate	3.70	1.03	Agree
The lack of direct communication with lecturers affects my self-motivation (R)	3.61	1.20	Agree
The university has provided the necessary technical support for the E-learning process	3.53	1.11	Agree
The university provides online portals to access the textbooks and reference materials	3.47	1.08	Agree
E-learning enables the instructor to record the lecture and listened again by learners	3.41	1.26	Agree
I support continuing with e-learning for some elective courses after the end of the coronavirus crisis	3.30	1.44	Moderate
The university provided alternative solutions in the event of a problem during the exams	3.20	1.12	Moderate
The lack of Internet, or having no computers at home, has affected the online learning (R)	3.17	1.43	Moderate
I have found some technical problems while taking exams online (R)	3.09	1.20	Moderate
I have faced some technical problems browsing the university website (R)	2.98	1.23	Moderate
E-learning encourages cooperation among the students through online classes	2.97	1.19	Moderate
E-learning is more user friendly and convenient for instructor and learner	2.94	1.16	Moderate
E-learning provides equal chance of participation in Q&A and class discussion	2.94	1.20	Moderate
E-learning enhances the student in critical thinking, analysis, problem-solving	2.91	1.24	Moderate
E-learning improves the instructor's presentation of contents and activities	2.75	1.07	Moderate
E-learning raises the level of students' attainment and makes it enjoyable	2.69	1.11	Moderate
E-learning provides an interactive environment like face-to-face classes	2.55	1.12	Disagree
The home environment gives the ambiance of the classroom	2.42	1.12	Disagree
E-learning enhances the bonding between instructors and learners	2.33	1.02	Disagree
Total	2.83	0.43	Moderate

Authors' own compilation based on their survey research (2020); [a](R) indicates reversed items stating student dissatisfaction with the E-learning system. The overall mean contains reverse values of (R) items

Table 4: Independent samples t-test for mean differences of respondents about the E-learning system due to gender and nationality (N = 127)

Variables	Variable values	N	Mean	SD	t-test	df	p-values
Gender	Male	71	2.86	0.55	0.714	125	0.743
	Female	56	2.79	0.53			
Nationality	International student	95	2.90	0.54	2.756	125	0.005
	Hungarian student	32	2.60	0.48			

Authors' own compilation based on their survey research in 2020

Table 5: One way ANOVA test for differences among respondents' answers about the e-learning system due to age, level of study, faculty and year of study (N = 127)

Variables	Statistical	Sum of squares	df	Mean square	F	Sig.
Age	Between Groups	1.354	3	0.451	0.676	0.569
	Within Groups	35.800	123	0.291		
	Total	37.155	126			
Level of study	Between Groups	1.309	2	0.654	2.264	0.108
	Within Groups	35.846	124	0.289		
	Total	37.155	126			
Faculty	Between Groups	2.893	10	0.289	0.979	0.465
	Within Groups	34.262	116	0.295		
	Total	37.155	126			
Year of study	Between Groups	1.318	5	0.264	0.890	0.490
	Within Groups	35.836	121	0.296		
	Total	37.155	126			

Authors' own compilation based on their survey research in 2020

ambiance of the classroom and E-learning enhances the bonding between instructors and learners, the means of them are 2.55, 2.42 and 2.33, respectively. It is worth to note, however, that these characteristics are not institution-specific, they are possible drawbacks inherent in every E-learning systems[15].

In sum, we can conclude that the level of students' opinions about the E-learning system during the COVID-19 pandemic among students of University of Debrecen from different faculties is moderate and students prefer face-to-face learning system instead of the E-learning process. These results are similar to those of Yarkiner and Rabbani[16], Elhadary *et al*.[14], Adhikari *et al*.[21] and Abbasi *et al*.[15].

To achieve the research goals, the researchers tested the differences in the respondents' responses' overall mean according to the following demographic variables: gender, age, level of study, year of study, nationality and faculty. The researchers used independent samples t-test for gender and nationality and one-way ANOVA test has been used for age, level of study, year of study and faculty. The results revealed that there is a statistically significant difference in the responses of respondents at 5% significance level about the e-learning system during the COVID-19 pandemic among University of Debrecen students due to nationality and the difference is in favor of the international students. Regarding other demographic variables, the results showed that there are no statistically significant differences in the responses of respondents. The results are illustrated in Table 4 and 5.

To sum up, based on the results shown in this study, some students may face technical problems while taking exams or during online classes, these problems may come from university website or from the students devices, in both cases, university support is needed.

It is also found that the E-learning system doesn't provide the required interaction between students and lecturers and between students themselves, at the same time the discussion between them is required to enhance the understanding and creating a good study environment. This result is commonly considered a drawback of E-learning process[15]. Hence, following methods that make the discussion and interaction more effective between them is needed. For instance, let students participate in preparing some parts of the course content and search for references and ask them for feedback during the online lecture.

Finally, more than half of students recommend that it is necessary to continue with the E-learning system for some elective courses after the end of the coronavirus crisis which indicates that the E-learning system could be a supporting method with the traditional education system.

CONCLUSION

The purposes of the study were to obtain feedback from students who are actually attending online classes during the COVID-19 pandemic in one of the biggest Hungarian universities, i.e., the University of Debrecen. Besides, the study was looking forward to discovering the variations in the respondent's answers regarding demographic variables Moreover, the research aimed at offering recommendations for the decision-makers at the University of Debrecen to develop the E-learning system. The results of this study clearly show that the level of students' opinions about the E-learning system during the COVID-19 Pandemic at the University of Debrecen is moderate in general. To enhance the quality of the E-learning system, new methods should be used by the lecturers and by the students to raise the level of interaction in the E-learning environment. On the other hand, it is also recommended to continue with the E-learning system for some elective courses after the end

of the coronavirus crisis To sum up, the E-learning system is suitable for the current situation caused by the COVID-19 pandemic which is clear based on the results of the study. In the future, the E-learning system could be used as a supporting method with the traditional education system.

This study, however, is limited to the students of the University of Debrecen in Hungary. Moreover, the sample is not representative. Future studies can have a bigger and representative sample from more universities, additionally, they could focus on a comparison between the opinions of students and the academic staff about the E-learning system during the COVID-19 pandemic.

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