Doi: 10.32592/jorar.2023.15.1.5

Effect of Virtual Education on Achievement of the Goals of the University of Applied Sciences & Technology during the Covid-19 at the Applied Science Higher Education Institute Red Crescent Society of the Islamic Republic of Iran

Zahra Mollamohammad Alian Mehrizi[1], Batoul Khoundabi[1], Ahmad Soltani[1]

Date of submission: 12 Jan. 2023 *Date of acceptance: 30 Mar. 2023*

Original Article

Abstract

INTRODUCTION: Virtual education and learning exert diverse effects on courses of different natures. Moreover, considering that the prime goal pursued by universities of applied sciences and technology is to focus on skills enhancement, the method of presentation, and the tools used. The teaching method should be designed appropriately and evaluated in terms of effectiveness. The current research, focusing on the effect of virtual education on practical and theoretical courses, seeks to assess the impact of virtual education on the achievement of the goals of the University of Applied Sciences and Technology during the Covid-19 pandemic in the Applied Science Higher Education Institute Red Crescent Society of the Islamic Republic of Iran.

METHODS: This applied research was conducted based on a descriptive-survey design. Data collection tools were library resources and a researcher-made questionnaire.

FINDINGS: Based on the results and the means obtained for each item, holding question and answer sessions with the highest number of good and very good items ranked first. On the other hand, uploading videos and photos to the system and providing links to related resources ranked in last place.

CONCLUSION: According to the experience of virtual education in recent years following the Covid-19 pandemic, the use of hybrid methods, including online and face-to-face teaching is recommended for teaching in skill-oriented higher education centers.

Keywords: Electronic content; Electronic education; E-learning; University of applied sciences and technology; Virtual education

How to cite this article: Mollamohammad Alian Mehrizi Z, Khoundabi B, Soltani A. **Effect of Virtual Education on Achievement of the Goals of the University of Applied Sciences & Technology during the Covid-19 at the Applied Science Higher Education Institute Red Crescent Society of the Islamic Republic of Iran.** Sci J Rescue Relief 2023; 15(1): 43-49.

Introduction

E-learning refers to the use of new technologies, such as the Internet and multimedia, in education. Lack of time and place restrictions as well as individual and independent education, are deemed as the most important advantages of this method of education. The establishment of electronic education systems, which aim to overcome the limitations caused by time and geographical space, has provided the basis for establishing educational justice and education for people who are not able to attend the classroom for any reason and has facilitated the process of evaluating and improving the performance of students.

The web environment has proposed a new approach in the field of education and can bring about dramatic changes in educational methods (1). Due to the expansion of the boundaries of knowledge and technology, as well as the increase in educational demand, traditional educational methods alone cannot respond to the growing needs of communities. With all their advantages

1. Assistant professor, Applied Science Higher Education Institute Red Crescent Society of the Islamic Republic of Iran, Tehran, Iran
Correspondence to: Zahra Mollamohammad Alian Mehrizi, Email: zmehrizi@yahoo.com

and disadvantages, virtual education and electronic learning can play a key role in responding to these needs. With the closure of universities and educational centers due to the COVID-19 outbreak in Iran since the beginning of March 2019, virtual education entered formal education in universities and higher education institutions, replacing face-to-face teaching and learning.

Since the management of higher education institutions is not possible without considering their performance and the Covid-19 pandemic has forced students and higher education institutions to meet and communicate through digital tools, digital and online methods have assumed more critical importance (2). Owing to significant advances in science and technology, as well as the access of millions of users all over the world to virtual electronic media, these media have attracted the attention of many people due to their extensive functions and interactions (3). The main goal of virtual education is to provide an educational environment in which individuals can have fair access to quality learning and optimize the methods of presenting course materials based on scientific educational methods for effective learning.

In their research, Sardasti et al. have examined critical education in practical and theoretical courses in the field of architecture (4). Nichols made a comparison between two face-to-face and virtual classes and concluded that virtual education could be held in two simultaneous and non-simultaneous formats, with a possibility of teacher-student interaction in each model. (5) In another research entitled "Evaluation of the quality of online educational courses," McGorry (6) identified the critical factors involved in the design of these courses. They studied the two components of online curriculum design, professor-student interaction, and course content.

In their study, Yasini and Taban investigated the effectiveness of virtual education courses from the point of view of Tehran University professors and students. The effectiveness criteria of educational courses are course content, teaching-learning activities, page design, organization of course materials, provided feedback, flexibility, amount of workload and assistance to students (7). In the same context, Hessari and Chegini (8), in their research, explained the place of virtual education in the field of architecture, specifically in the theoretical and practical courses. They concluded that the effectiveness of the components related to virtual education differ in theoretical and practical courses, and it is more pronounced in theoretical courses than in practical courses.

In general, the review of the literature demonstrated that various studies have been conducted on the effectiveness of electronic education. The educational courses at the University of Applied Sciences and Technology include theoretical and practical education. This topic provides the basis for evaluating the impact of virtual education in this university. The course design process in this university is approved based on the combination of 40% and 60% of theoretical and practical education. Considering the different nature of these types of courses, the special conditions during the Covid-19 pandemic, and the need for holding online classes, it is necessary to assess the effect of the e-learning environment of the University of Applied Sciences and Technology on both groups of theoretical and practical courses.

Considering the importance and necessity of the problem, the present research aimed to determine the effect of virtual education on the achievement of the goals of the University Applied Sciences and technology during the Covid-19 pandemic in the Iran-Helal Institute of Applied Science and Technology in Tehran during the Covid-19 pandemic. Although the Covid-19 pandemic has imposed multiple challenges on various sectors of society, including the health sector, it has flourished capacities and strengthened opportunities in areas, such as higher education, across the country. (9 & 10) The first case of Covid-19 was reported in Iran on February 19, 2020, and following that, the government decided to close all universities and schools to control the spread of the disease and encourage people to stay at home to prevent disease transmission. (11)

Due to the contagiousness of this disease and its high prevalence, most schools and universities around the world were forced to stop face-to-face activities and turned to online educational environments. (5&6) Prior to the Covid-19 pandemic, the main purpose of online education was to provide people who were not present in class with an environment to access content in a traditional way. Considering that now this goal

[DOI: 10.32592/jorar.2023.15.1.5]

has been changed to support the continuity of education and the development of the education system, it will be of great interest to find out which dimensions of emergency distance education will continue in higher education even in the post-pandemic era. (12)

Electronic education without providing the necessary support infrastructure leads to the same problems posed to classical education, such as inclusive interaction, access to study resources, learner concentration and attention, regularity, time management, and evaluation. (13) Reno Gupta et al. (2021), in their online survey, investigated the opinions of three groups, including students, parents, and teachers, regarding the ease of access, attention, learning outcome, stress level, and preferred learning style via Gmail and What'sApp. Almost all respondents could access virtual operating systems. Based on the results, 48.3% of students felt uninterested in online classes, while 71.6% were not satisfied with their understanding of the subject. Only 11.3% of students were sure that they were evaluated fairly during the final exam. An increased workload (57.7%) and screen time (94.2%) of children has become a great concern for parents.

Online education has provided an effective solution in the conditions of the Covid-19 pandemic; nonetheless, it cannot replace face-to-face learning, which guarantees the overall development of the youth for a better future. (14) Sengupta et al. (2022) examined the various features and facilities available in some widely used online platforms in virtual education and their suitability from the perspective of the socio-economic constraints of students in India. Their review study pointed out those SaaS-based packages, such as "G-Suite for Education" or "Office 365 Education," can be a better choice than integrating multiple services with an LMS. Moreover, a comparison was made of the features of popular electronic products for virtual classes and live sessions, respectively. (15)

Sadri Arhami (2013) considered cultural issues a problematic factor in the planning and implementation of the virtual learning plan. He believes that the development and implementation of the plans designed in electronic schools and institutions can be hindered by some issues, such as confrontation and opposition of people in using new methods against traditional methods of education, particular problems, including the telecommunication platform in Iran, the lack of suitable educational software, and the high cost of hardware. (16)

The young population of our country and the potential of education based on information and communication technology in response to current and future challenges, as well as the diversity of higher education, highlight the critical need for virtual education. In this research, after examining a collection of available books, magazines, and theoretical foundations, we examine the importance of virtual education in the covid-19 pandemic era and the opportunities and challenges of virtual education. Furthermore, in the end, several solutions to solve the challenges are presented.

Methods

This descriptive-analytical cross-sectional study was conducted in the summer and autumn of 2021. The studied population includes all students at the Iran-Helal Institute of Applied Science and Technology (n=221). A total of 100 students studying at the Iran-Helal Institute of Applied Science and Technology in Tehran were selected and studied based on the formula for determining the sample size as below:

$$n = \left(\frac{z_{1-\alpha/2} * \sigma}{d}\right)^2$$

In the mentioned formula, d, σ, and Z1-α/2 are, respectively, the estimation error of the desired parameter, the variance of the studied variable, and the normal distribution with a probability of 1-α/2. Since one of the key variables analyzed in this study is the learning rate of practical courses, the parameter estimated in this formula is the mean of this variable. The value of σ was calculated based on a pilot sample size of 20 and inserted into the formula. Moreover, the value of d and Z1-α/2 are included, respectively. Therefore, the number of samples was considered 100 as follows:

$$n = \left(\frac{z_{1-\alpha/2} * \sigma}{d}\right)^2 = \left(\frac{1.96 * 2}{0.4}\right)^2 \approx 96$$

The data collection tool in this research was a researcher-made questionnaire. The questionnaire was prepared in three sections, individual

[DOI: 10.32592/jorar.2023.15.1.5]

characteristics, educational tools, system evaluation, and learning rate of theoretical and practical courses, respectively. To confirm the content validity of the qualitative, we inquired about the opinions of five education experts with doctorate and master's degrees regarding the observance of grammar, the use of appropriate words and phrases, the placement of questions in their appropriate place, appropriate scoring, and the time taken to complete the designed tool.

Moreover, for the quantitative content validity, the content validity ratio (CVR) and content validity index (CVI) were calculated. To determine the CVR, six experts in this field were consulted about the necessity or non-necessity of each item and CVR values higher than 0.67 were accepted. To determine the CVI, the criteria of relevance, clarity, and simplicity of each item were examined, and values higher than 0.79 were accepted (1). In order to determine the reliability indicators in a preliminary study, the questionnaire was completed by 20 students with a time interval of 2 weeks. In addition, the value of Cronbach's alpha was calculated based on internal consistency for the whole questionnaire. Test-retest was also checked using ICC.

The participants in this preliminary research were randomly selected from among the students. The ICC (Intra class Correlation Coefficient) index was calculated at 0.85, and Cronbach's alpha was 0.77. After the final approval, the questionnaire was prepared online and provided to education experts in the center. The link of the questionnaire was sent to students using groups in virtual networks, including What'sApp. After data saturation, the information was extracted from the server and provided to the statistical analyst as an Excel file.

Statistical analysis

The data were entered and analyzed in SPSS software (version 26). Quantitative variables were described based on statistical indicators of mean and standard deviation, and qualitative variables were presented as frequency and percentage. In addition, different types of graphs and tables were used to summarize the data. The assumption of normality of quantitative variables was assessed using the Kolmogorov-Smirnov test. The comparison of the variables before and after the Covid-19 pandemic (face-to-face and virtual training) was made using paired t-test or Wilcoxon signed rank at a significance level of 5%.

Findings

Table 1 displays students' demographic characteristics. In total, 75 (75%) male and 25 (25%) female students responded to the questions. The response rate to questions was 100%. The mean age of the students was 33.8±5.1 years. The average time to answer the questionnaire was 10.2 min. Table 2 presents students' opinions about educational tools in the virtual education method for theoretical and practical courses. As illustrated in Table 2 and the mean scores obtained for each item, holding question and answer sessions with the highest number of good and very good items ranked first. On the other hand, uploading videos and photos to the system and providing links to related resources ranked in last place. The interesting point is that according to students, uploading pamphlets to the system for practical courses ranked first, and holding face-to-face workshops ranked in last place. Charts 1 and 2 demonstrate the level of learning and satisfaction of students with the educational content of courses before and during the Covid-19 pandemic.

Based on the results of the Wilcoxon signed rank test, face-to-face, and virtual education methods significantly differed in the mean learning rate for both theoretical and practical courses. In this regard, the mean learning rates of theoretical courses from students' points of view in face-to-face and virtual forms were 2.69 and 3.47, respectively, pointing to a significant difference ($P<0.01$) (Chart 1). In addition, the mean learning rates of practical courses from students' point of view in face-to-face and virtual form were 2.92 and 3.36, respectively, demonstrating a statistically significant difference ($P=0.025$) (Chart 1).

The interesting point to note in the test of the difference between the mean learning rate of theoretical and practical courses in both face-to-face and virtual education methods is that the mean learning rate of practical courses in face-to-face education was significantly higher than the mean learning rate of theoretical courses from the students' point of view (2.92 versus 2.69) ($P=0.031$).

[DOI: 10.32592/jorar.2023.15.1.5]

Table 1. Demographic variables of students

Variable	Mean (SD)
Gender (male)	75(75%)
Age	33.5±8.1
Educational stage (bachelor)	58(58%)
Major	
Natural disaster relief	84(84%)
HSE	4(4%)
Social work	9(9%)
English language	3(3%)
Number of theoretical units completed during the Covid-19 pandemic era	24.2±9.6
Total number of theoretical units passed	25.8±4.5
Number of skill units passed during the Covid-19 pandemic era	8.9±8.1
Total number of practical units passed	11.5±5.3

Table 2. Students' opinions about educational tools

Educational tool	Very good	Good	Medium	Weak	Very weak	Mean	Rank
Theoretical	5	4	3	2	1		
PowerPoint	20	41	23	6	10	3.55	4
Uploading the pamphlet to the system	27	36	22	7	8	3.67	2
Uploading videos and photos to the system	25	28	28	10	9	3.50	5
Online question-and-answer sessions	30	40	20	3	7	3.83	1
Uploading question and answer files provided in previous classes	28	29	27	7	9	3.60	3
Providing links to related resources (sites, articles, etc.)	22	33	27	9	9	3.50	5
Practical							
PowerPoint	21	32	30	6	11	3.46	4
Uploading the pamphlet to the system	27	38	18	11	6	3.69	1
Uploading videos and photos related to the subject in the system	23	30	30	8	9	3.50	3
Live performance of the skill by the teacher	27	36	19	10	8	3.64	2
Holding face-to-face workshops with a small number of students	14	30	29	9	18	3.13	5

Table 3. Evaluation of the system and the held tests from the students' points of view

Description	Mean±SD
Congruency between the test and theoretical lessons	3.61±0.94
Congruency between the test and the practical courses provided	3.63±0.94
Ensuring the score obtained from the evaluation of the virtual education system	3.62±0.92
Evaluation process in the environment of the virtual education system	3.66±1.20
Log in to the virtual education system	2.18±1.34
The clarity and expressiveness of the menus used in the virtual education system	2.31±1.45
**Appearance of system pages	2.97±1.48
The quality of audio and video transmission in the virtual education system	2.16±1.30

*In all questions, the highest score is 5 and the lowest score is 1.

While the mean learning rate of skill and theoretical courses from students' point of view in virtual education showed no statistically significant difference (3.36 versus 3.47) (P=0.291). Chart 2 displays the changes in the mean level of students' satisfaction (between 1 (very inappropriate) and 5 (very appropriate)) with the educational content of theoretical and practical courses. The difference in the mean level of satisfaction with the content of theoretical courses in both face-to-face and virtual methods was not significant (P=0.105) (3.53 versus 3.79).

Furthermore, the difference in the mean level of satisfaction with the content of practical courses in both face-to-face and virtual methods was not significant (P=0.061) (3.38 vs. 3.72). The

[DOI: 10.32592/jorar.2023.15.1.5]

difference in the mean level of satisfaction with the educational content of theoretical and practical courses in both face-to-face and online methods was not significant (P<0.05). Table 3 illustrates the results of the evaluation of the system and the held tests from students' points of view.

Discussion and Conclusion

In general, the goal of e-learning is to provide the possibility of equal access to courses and develop a uniform educational environment for different social classes and optimize the appropriate methods of presenting materials for more successful learning. During the Covid-19 pandemic, education around the world underwent a dramatic transformation, and we witnessed a transition to virtual and online methods in schools and higher education institutes across the globe. Although virtual education was used before the outbreak of Covid-19, with the commencement of this lengthy pandemic, the researchers recognized the importance of examining the dimensions of virtual education.

The present study aimed to investigate how virtual education is conducted in University of Applied Sciences and Technology, where a focus is placed on both theoretical and practical courses. Based on the results of this research, there was a statistically significant difference between the mean learning rate for both theoretical and practical courses between face-to-face and virtual education methods. That is, according to the students, learning in the virtual method was better than that in the face-to-face method. Considering the comparison between learning theoretical and practical courses, students believed that during face-to-face teaching, they outperformed in theoretical courses, while during virtual training, their learning in theoretical and practical courses was the same, and there was no significant difference.

In agreement with the results of the present research, in a study conducted by Saad Mohammadi et al. (2013), the amount of learning from students' point of view in theoretical courses using the virtual education method was estimated to be higher than the expected average (17). Another investigation carried out in the current study was to compare the level of satisfaction with educational content from students' points of view. To this end, there was no significant difference in content satisfaction for theoretical and practical courses in both face-to-face and virtual education methods.

In addition, although the level of satisfaction was higher in the virtual method than in the face-to-face method, this increase was not significant. The level of access to educational content in the study by Saad Mohammadi et al. was also proof of the fact that despite the educational method (face-to-face and virtual), educational content will be optimally presented and available. Moreover, the study by Saeedi Nejat et al. (2010) denoted that the quality of educational content provided via computers was 91.7% at the complete and average level. (18)The courses that, in addition to theoretical topics, have the skill and practical dimensions require the establishment of a virtual educational system based on the needs and necessary tools of such courses. From the total review of other studies and the results of the present research, the following points can be summarized:

Due to the fact that virtual education in Iran was not pursued seriously before the Covid-19 pandemic and its infrastructure was not available, it has faced daunting challenges in design and implementation, which diminished its success. On the other hand, the Covid-19 crisis can be a golden opportunity to identify infrastructural defects in this field and reveal an imbalance in the fair distribution of the required infrastructures in the Internet and networks sector, especially in the remote and underprivileged areas. Undoubtedly, growth and excellence in this field will be the starting point for the continuation and improvement of the quality of virtual education at the national level.

Considering that from students' point of view, the amount of learning in both face-to-face and virtual methods was largely the same, it is recommended to use hybrid methods for teaching in higher education centers. One of the most important issues and challenges presented to students during virtual education is the problems of necessary systems and infrastructures. Therefore, the improvement and upgrading of the infrastructure will provide the basis for the development of virtual education. Considering the difference in the nature of the courses, it is recommended to train teachers to use appropriate teaching tools.

[DOI: 10.32592/jorar.2023.15.1.5]

Acknowledgments

None

Conflict of Interests

The authors declare that there were no conflicts of interest in this study.

References

1. Rafiei M, Ghaffari H, Khorami M. Evaluating the effectiveness of e-learning method in human resource education (Case study of Markazi Province PNU). ETL. 2017; 4(16): 71-84 [In Persian].
2. Iivari N, Sharma S, Ventä-Olkkonen L. Digital transformation of everyday life–How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care?. Int J Inf Manage. 2020; 55: 102183
3. Rahbari M, Tousi F. Examining the challenges and problems of teaching virtual space during the outbreak of the corona virus, the first international conference on new ideas in jurisprudence, law and psychology, Tehran. 2021 [In Persian].
4. Sardashti S, Mozaffar F, Shafaie M. The efficacy of using critical pedagogy as a teaching method in masters, architectural design course (1) on graduate students' motivation. AAUD. 2020; 12(29): 31-43 [In Persian].
5. Nicholas M. A theory for E Learning. J Educ Techno Soc. 2012; 6 (2): 1-10
6. McGorry SY. Measuring quality in online programs. Internet High Educ. 2023; 6 (2): 159-177
7. Yasini A, Taban M. Studying the effectiveness of virtual education courses from the point of view of professors and students (case study: University of Tehran), Iranian Higher Education Scientific Research Journal. 2015; 28: 175-198
8. Hessari P, Chegini F. Investigating the effectiveness of virtual education in practical and theoretical courses in the field of architecture. TEJ. 2022; 16(2): 281-92 [In Persian].
9. Dastani M. COVID-19 and online education in Iran universities of medical sciences: a narrative review. Jundishapur J Health Sci. 2021; 13(3): e116958 [In Persian].
10. Ghafourifard M. The promotion of virtual education in Iran: The potential which turned into reality by Coronavirus. Iran J Med Sci. 2020; 20: 33–4 [In Persian].
11. Ghanbari S, Rezghi Shirsavar H, Ziaee MS, Mosleh M. Evaluating the effectiveness of virtual education on health care management students. J Health Manag. 2019; 10(2): 49-60 [In Persian].
12. Lockee BB. Online education in the post-COVID era. Nat Electron. 2021; 4(1): 5-6.
13. Manzoor A. Online teaching and challenges of COVID-19 for inclusion of PWDs in higher education. Daily Times. 2020.
14. Gupta R. Teaching to learn and learning to teach. Eur Early Child Educ Res. 2011; 19 (1): 1-4.
15. Sengupta P, Wilensky U. Learning electricity with NIELS: Thinking with electrons and thinking in levels. Int J Comput Math. 2009; 14: 21-50.
16. Sadri Arhami M. Virtual education in Iran and solutions with an emphasis on higher education, Faculty of Accounting and Management, Allameh Tabataba'i University, Master's Thesis. 2013[In Persian].
17. Saad Mohammadi M, Sarmadi M, Farajollahi M, Ghorbania Delavar A. Studying the state of virtual higher education in terms of education services provided in Iran, Journal of Educational Sciences, Research in Educational Systems. 2013, 9(29):54-39[In Persian].
18. Saeedi Nejat S, Vafaee-Najar A. The effect of E-Learning on students' educational success. IJME. 2011; 11 (1): 1-9 [In Persian].

[DOI: 10.32592/jorar.2023.15.1.5]