Uluslararası İleri Doğa Bilimleri ve Mühendislik Araştırmaları Dergisi
Sayı 9, S. 311-318, 2, 2025

Araştırma Makalesi

IJANSER
https://as-proceeding.com/index.php/ijanser
ISSN:2980-0811

International Journal of Advanced Natural Sciences and Engineering Researches
Volume 9, pp. 311-318, 2, 2025

Research Article

The Impact Of Covıd-19 On Mechanical Engineering Education In Turkey: Survey Research

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(Received: 12 February 2025, Accepted: 17 February 2025)

(2nd International Conference on Recent and Innovative Results in Engineering and Technology ICRIRET, February 11-12, 2025)

ATIF/REFERENCE: Türkkan, Y. A. (2025). The Impact Of Covıd-19 On Mechanical Engineering Education In Turkey: Survey Research. *International Journal of Advanced Natural Sciences and Engineering Researches*, 9(2), 311-318.

Abstract – The study aims at determining problems that students have faced, and the positive and negative effects of online education during pandemic period. The distance education evaluation research was conducted on January 18, 2021 using web survey method. In order to determine the difference between the responses of the participants to the questionnaire, normality test, reliability test, frequency analysis and t test were applied using the S.P.S.S. program. The survey shows that although distance education was preferred during the pandemic period. Most of the participants think that the epidemic negatively affects the quality of education.

Keywords – Engineering, Survey Research, COVID-19, Education, S.P.S.S.

I. INTRODUCTION

COVID-19 (Coronavirus) appeared in Wuhan, China in December 2019. It was declared a pandemic by WHO after affecting many countries globally (Bruin et al.,2020). Measures that started in China, where the COVID-19 epidemic was first detected, started to be implemented in other countries where the epidemic was later seen, and when the epidemic did not stop, the measures were increased and continued until the last stage, the curfew. Many studies have shown that widespread outbreaks of COVID-19 are associated with public panic (Bao et al., 2020; Rajkumar, 2020; Li et al., 2020; Zhao et al.,2020). The leading sectors affected by this period are the education sector and students who are an integral part of them, as well as many other sectors such as production, industry, trade and transportation. Due to the sudden measures taken after the COVID-19 epidemic, formal education was suspended and distance education was commenced in a short time in our country.

Since education is a service that the state provides to all its citizens equally, it is important that it must continue uninterruptedly. Especially in compulsory education, there may be times when educational institutions cannot be opened or individuals cannot go to educational institutions. In extraordinary situations such as war, terror, natural disasters, epidemics, education may be disrupted. In such cases, distance education model is a better choice. Distance education is an innovative education system that is independent of time and place, and takes place entirely in virtual environments where learners and

teachers do not have to come together (Enfiyeci and Büyükalan, 2019), (Niazkar et al., 2020). Distance education is defined as systems that allow individuals to follow their learning experiences not under a specific institution but from wherever they are. In other words, the basic principle of distance education is that individuals, teachers and learning objects take place in different environments (Yates and Bradley, 2000).

This study aimed at investigating effects of the global epidemic on university students and mechanical engineering education and survey applied to Bayburt University mechanical engineering students was conducted for this purpose. 167 people participated in the study and while evaluating the survey results, normality test, reliability test, frequency analysis and t test were applied using the program S.P.S.S. (Statistical Package for the Social Sciences) (Pallant, 2007).

II. MATERIALS AND METHOD

2.1. Samples and Survey

The research domain consists of Bayburt University mechanical engineering students. A survey was applied to a randomly selected group on January 18, 2021. The participants were 3rd and 4th year Bayburt University mechanical engineering students. There are various methods to determine the sample size (N). Sencer and Irmak (Sencer and Irmak, 1984) proposed that sample size should be equal to 10 times the number of independent variables (m) (N=10m). There are some studies that propose the N be 15 times m (N =15m) or (N > 50+ 8m) (Pallant, 2007). In this study, there are three independent variables: age, gender, and education status. Even if the last criteria of Pallant is applied, the sample size must be greater than $50 + 8 \times 5 = 90$; therefore the sample size (167) is adequate.

Survey data were collected through online systems (web survey method) where participants voluntarily filled out the questionnaire. In the questionnaire applied, 3 main parts are measured; general information and demographic structure of the participants (5 statement), the impact of the pandemic process on family life (4 statement), and the status and conditions of participating in distance education (9 statement). The 5-point Likert rating was used in the study (1 Strongly Disagree, 2 Disagree, 3 Unsure, 4 Agree, 5 Strongly Agree). The statements in the questionnaire were prepared by considering studies in literature (Eryılmaz Türkkan and Hırca, 2021; Wang et al.,2020; Çiçeklioğlu and Akmaz, 2020; Kahraman, 2020). In order to eliminate the risk of misunderstanding, simple and plain language was used in the survey.

2.2. Data Analysis

The data obtained from the questionnaires were analyzed with S.P.S.S (Pallant, 2007). In order to determine the difference between the responses of the participants to the questionnaire, normality test, reliability test, frequency analysis and independent t test were applied to evaluate the study according to gender, class, living with the family during the pandemic period, and having had COVID-19. In the study, the analyzes were not done in groups and the questionnaire was handled and interpreted as a whole.

III. RESULTS

In this work, a survey was conducted to investigate the impact of the global pandemic on university students and mechanical engineering education. A total number 167 Bayburt University mechanical engineering students participated in the survey.

As a result of the normality test performed with S.P.S.S., skewness and kurtosis values were found between +2 and -2 (George and Mallery, 2010) meaning that the data were distributed normally. Cronbach's Alpha application was used for reliability analysis. Since Cronbach's alpha is greater than 0.70 (Cronbach, 1951) the expressions used are reliable. Based on frequency analysis, 21.1% of the participants were women and 78.9% were men. 35.5% of these individuals are 3rd year and 64.5% are 4th year students. 93.3% of the students who took part the questionnaire spend the distance education period

with their families. 57.2% of the participants stated that they participated in distance education from their own computers, 9% from someone else's computer, 33.1% from their own mobile phone/tablet, 0.7% from someone else's mobile phone/tablet. 16.3% of the participants have had COVID-19. The results of the t test are presented in Table 1, Table 2, Table 3 and Table 4, respectively, according to classes by gender, the state of staying with family after leaving the city where they were studying and the status of having contracted COVID-19. In the t test, if the evaluation criterion is $p < 0.05$, there is a significant relationship; if $p > 0.05$, there is no significant relationship.

Table 1. T-test result based on gender

Expressions (A1-B9)	t-test *t*	*p*
(A1) Has the pandemic period caused changes in family life?	1.602	0.114
(A2) Have any quarrels, tension, or uneasiness occurred within the family due to living together?	2.276	0.026
(A3) Have you experience stress or increased responsibility due to someone in the family being a healthcare worker, ill or dying because of Covid-19?	-0.607	0.544
(A4) Has the pandemic period economically affected you or your family?	3.319	0.001
(B1) Are your conditions for participating in distance education (your physical working environment and technological infrastructure) sufficient?	-1.068	0.287
(B2) Do you think your university's distance education software application (Microsoft Teams etc.) is sufficient?	-3.071	0.002
(B3) Do you find the content of the distance education lessons sufficient?	-2.496	0.014
(B4) Do you think the lecturers are competent in distance education?	-2.721	0.007
(B5) Would you like distance education to be applied to all lessons and be used permanently?	-2.334	0.021
(B6) Do you miss the classroom, campus life?	3.108	0.003
(B7) Do you think the COVID-19 outbreak has positively affected the quality of education?	-4.646	0.0001
(B8) Do you think the COVID-19 outbreak has negatively affected the quality of education?	4.939	0.0001
(B9) Do you think distance education increases your success in classes?	-1.713	0.089

Table 2.T-test result by class

Expressions (A1-B9)	t-test *t*	*p*
(A1) Has the pandemic period caused changes in family life?	-0.454	0.651
(A2) Have any quarrels, tension, or uneasiness occurred within the family due to living together?	2.064	0.041
(A3) Have you experience stress or increased responsibility due to someone in the family being a healthcare worker, ill or dying because of Covid-19?	-0.028	0.978
(A4) Has the pandemic period economically affected you or your family?	-0.835	0.405
(B1) Are your conditions for participating in distance education (your physical working environment and technological infrastructure) sufficient?	0.757	0.450
(B2) Do you think your university's distance education software application (Microsoft Teams etc.) is sufficient?	-0.631	0.529
(B3) Do you find the content of the distance education lessons sufficient?	-1.802	0.073
(B4) Do you think the lecturers are competent in distance education?	-1.775	0.078
(B5) Would you like distance education to be applied to all lessons and be used permanently?	-2.467	0.015
(B6) Do you miss the classroom, campus life?	2.012	0.046
(B7) Do you think the COVID-19 outbreak has positively affected the quality of education?	-2.111	0.037
(B8) Do you think the COVID-19 outbreak has negatively affected the quality of education?	1.216	0.226
(B9) Do you think distance education increases your success in classes?	-2.790	0.006

Table 3. T-test result based on living with family during the pandemic

Expressions (A1-B9)	t-test *t*	 *p*
(A1) Has the pandemic period caused changes in family life?	-0.271	0.786
(A2) Have any quarrels, tension, or uneasiness occurred within the family due to living together?	1.112	0.268
(A3) Have you experience stress or increased responsibility due to someone in the family being a healthcare worker, ill or dying because of Covid-19?	-1.312	0.191
(A4) Has the pandemic period economically affected you or your family?	1.037	0.301
(B1) Are your conditions for participating in distance education (your physical working environment and technological infrastructure) sufficient?	-1.818	0.071
(B2) Do you think your university's distance education software application (Microsoft Teams etc.) is sufficient?	-2.154	0.051
(B3) Do you find the content of the distance education lessons sufficient?	-1.737	0.084
(B4) Do you think the lecturers are competent in distance education?	-1.842	0.067
(B5) Would you like distance education to be applied to all lessons and be used permanently?	-0.853	0.395
(B6) Do you miss the classroom, campus life?	1.065	0.288
(B7) Do you think the COVID-19 outbreak has positively affected the quality of education?	-1.282	0.202
(B8) Do you think the COVID-19 outbreak has negatively affected the quality of education?	0.623	0.534
(B9) Do you think distance education increases your success in classes?	-1.356	0.177

Table 4. T-test result based on whether someone has had COVID-19

Expressions (A1-B9)	t-test	
	t	*p*
(A1) Has the pandemic period caused changes in family life?	0.435	0.664
(A2) Have any quarrels, tension, or uneasiness occurred within the family due to living together?	1.620	0.115
(A3) Have you experience stress or increased responsibility due to someone in the family being a healthcare worker, ill or dying because of Covid-19?	1.005	0.317
(A4) Has the pandemic period economically affected you or your family?	-1.144	0.254
(B1) Are your conditions for participating in distance education (your physical working environment and technological infrastructure) sufficient?	0.874	0.383
(B2) Do you think your university's distance education software application (Microsoft Teams etc.) is sufficient?	-0.611	0.545
(B3) Do you find the content of the distance education lessons sufficient?	0.743	0.458
(B4) Do you think the lecturers are competent in distance education?	0.351	0.726
(B5) Would you like distance education to be applied to all lessons and be used permanently?	-0.857	0.393
(B6) Do you miss the classroom, campus life?	-0.224	0.823
(B7) Do you think the COVID-19 outbreak has positively affected the quality of education?	-0.521	0.603
(B8) Do you think the COVID-19 outbreak has negatively affected the quality of education?	-0.565	0.573
(B9) Do you think distance education increases your success in classes?	-1.732	0.085

IV. CONCLUSION

The COVID-19 (Coronavirus) epidemic that emerged in Wuhan, China in December 2019 has affected the whole world and made it necessary for individuals to make changes in their lifestyle. All countries of the world are taking various measures to save time for treatment and to reduce the rate of transmission and loss of life. One of the most important of these measures is the use of distance education systems.

In this study, the effect of distance education, as a result of the pandemic, on university students and mechanical engineering education was investigated. To do this, a survey including a total number 167

individuals was carried out with the participation of Bayburt University mechanical engineering students. In order to determine the difference between the responses of the participants to the questionnaire, normality test, reliability test, frequency analysis and t test were applied using the S.P.S.S. (Statistical Package for the Social Sciences) program.

Most of the respondents were men and the rate of 4th year students is higher. Most of the respondents stated that they lived with their families during the epidemic. Participants mostly preferred their own computers as a way of participating in distance education. The vast majority of respondents have not had COVID-19. Most of the participants think that the pandemic has caused a change in family life, that there has not been family dispute, tension, anxiety, etc. due to staying with their family, and that increased responsibility and stress have not occurred due to someone in the family being a healthcare worker, falling ill or dying because of Covid-19. However, participants were undecided about the conditions for participating in distance education (physical working environment and technological infrastructure), the adequacy of the content of the lessons taught, the competence of the instructors and the increase in success in lessons. They do not want distance education to continue in all lessons and permanently. Most of the participants stated that they miss the classroom environment and campus life, and most of the participants think that the epidemic has negatively affected the quality of education. The majority of the participants think that the pandemic has affected their family and themselves economically and they find the distance education application of the university sufficient.

There is a significant relationship and difference between men and women for the expressions A2, A4, B2, B3, B4, B5, B6, B7, B8. While there is a significant relationship between the expressions of A1, A2, B5, B6, B7, B9 between the 3rd and 4th year students participating in the survey, there is no difference between those who live with family during the pandemic and those who do not. There is no significant difference between those who have had COVID-19 and those who have not.

Due to the COVID-19 epidemic or events that may disrupt any kind of education, educational institutions should develop curricula and content suitable for the distance education method for practical courses within their organization. The results of the research do not make a generalization claim for other university students. In this context, it is suggested that future research should be carried out by including individuals from different universities. main conclusions of the study should be summarized in a short Conclusions section.

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