The attitudes of landscape architecture students towards distance and face-to-face education methods and the effects of the two education methods on academic achievement in the project course

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Abstract
This study aimed to compare the achievements of the students who attended the Environmental Design Project course at Karadeniz Technical University (KTU) in various years with the face-to-face (FE) and distance (OE) education methods. The study was conducted with 130 students. In the initial stage, ANOVA was conducted to determine whether there was a difference between student attitudes towards FE and OE methods in the Environmental Design Project studio. In the second stage, the research problem, namely “Does the implementation of landscape architecture environmental design project instruction with FE and OE methods affect the academic achievements of the students? was investigated and a quasi-experimental study with a control group was conducted on the achievement test (50 questions) results. The achievement test was applied to the students who took environmental design lessons for one semester (14 weeks) with both methods before the 14-week semester (pre-test) and after the semester (post-test). There was no statistical difference between the pre-test scores of both groups ($p > 0.05$), while there was a difference ($p < 0.05$) between the post-test scores. This finding demonstrated that there was a significant difference between the effects of these two methods on the academic success of the students.

Keywords Landscape architecture · Environmental design project · Face-to-face education · Distance education · Academic achievement

Introduction
The COVID-19 virus was initially identified in China and rapidly became a pandemic, and everyone started to live under the threat of the disease induced by this virus. The World Health Organization declared it a pandemic on March 11, 2020. As a result, all nations
adopted particular measures such as flight bans, quarantine, social distancing, and martial law to slow down the spread. Several industries, especially the health industry, were affected during the pandemic. Among these industries, education was one of the most affected industries (Huang et al., 2020; Yuan et al., 2020; Zhang et al., 2020; Macit & Macit, 2020; Üstün & Özciftçi, 2020: 144).

Unfortunately, despite advances in vaccine research, the Covid-19 pandemic still affects all aspects of global life. This was the first time when there was a global scale impact on education. All educational institutions from preschool to higher education levels were rapidly closed to limit the spread of the new Coronavirus disease (COVID-19) in several countries (Karadağ and Yücel, 2020). Education activities were halted for approximately 1.58 billion students (91.4% of all enrolled students), and almost all education systems adopted distance education (ILO, 2020).

The pandemic distanced over a billion students from the face-to-face educational environment. As countries tried to close this compulsory gap in education with distance education platforms, they also attempted to minimize the negative effects of the pandemic on education. The unexpected closure of educational institutions globally and the adoption of education at home on digital platforms due to the quarantine led to the employment of online education or distance education platforms. Similar to other nations, face-to-face training was replaced by distance education in Turkish universities.

The Turkish universities that switched to distance education quickly resolved related problems, developed online platforms and provided remote access for the students. Several platforms were developed and eventually employed by the students. In this context, a learning management system called 'Moodle' was implemented at Karadeniz Technical University for distance education. Similar to the other departments, landscape architecture students could access various learning tools such as resources, assignments, and announcements, and attend live classes in virtual classrooms on this system. 'Moodle' is an online platform. Students log into the system with their usernames and passwords and could access data on all previous courses they attended, live online course links, and the assignments given by the instructors. The course activities and resources are added by the instructor, and for each course, the instructor uploaded weekly course content (word documents, pdf or ppt files, photos, videos, audio, text documents, etc.) and instructed the live courses. Furthermore, students and instructors could constantly communicate using tools such as Google classroom, e-mail, telephone, and WhatsApp. Thus, the environmental design project course was conducted on this system similar to the other courses in the Department of Landscape Architecture at KTU.

This study aimed to investigate.

1. Student attitudes towards the above-mentioned education methods and
2. The impact of these education methods on the academic achievements of the students in the environmental design course at the landscape architecture department.

**Environmental design project education at KTU Landscape Education Department**

The Environmental Design Project studio course is instructed during seven semesters at KTU, Department of Landscape Architecture (Fig. 1).

The students employ all knowledge and experiences acquired in these courses in environmental design project courses. Because the topic is different in each Environmental Design Studio course, and the required knowledge is different in each semester. These
The attitudes of landscape architecture students towards... courses tackle the concepts of decision-making, spatial development, spatial design, and human activity organization in landscape architecture with a holistic approach (Yılmaz et al., 2017; Eren & Yılmaz, 2020).

Except for environmental design project topics, the 14-week lecture syllabi for the environmental design project courses are similar. In other words, first, the topic and the location are selected, the occupants and the area are surveyed and analyzed, followed by the design phase. The initial stages of the design phase include the requirement program, area occupancy, preliminary design, hard/soft surface project, planting project, sectional view, detailed drawings, and the development of the presentation (Fig. 2).
The aim of the environmental design 1, 2, 3, 4, 5, 6 and graduation projects is to train environmental designers or landscape architects who could research, imagine and perceive the third dimension while working in two dimensions, and transform the abstract ideas into a concrete product. Thus, students are expected to develop a design and defend it with concrete expression techniques.

**Distance and face-to-face education methods**

Face-to-face education, the formal education method has been used for the acquisition of knowledge since ancient times before the introduction of media and communication tools, and in this education method, teachers and students participate in the process at the same time and location (Morgan, 2004; Özden, 2002; Kör et al., 2016).

The Turkish education system has adopted distance education for some time. The open education model has been employed in secondary and tertiary education for several years in Turkey. Furthermore, online education has been adopted in vocational training, career certificate programs, or language education. Currently, the number of students who attend distance education has increased globally due to the Covid-19 pandemic. Since March 26, 2020, theoretical or practical courses in formal education programs have been conducted with various distance education methods in all educational institutions in Turkey. The distance education system became dominant in conventional educational institutions to prevent the spread of the virus in real classrooms.

Thus, as of March 2020, education and instruction in Turkish universities, as well as pre-schools, primary schools, and high schools, were conducted with the distance education method. The distance education system was introduced in 1980 in Turkey and improved with the developments in information and communication technologies over the last 20 years (Bozkurt, 2017). However, in Turkish colleges, the distance education method was not implemented in vocational design or practical departments due to the lack of infrastructure. After the Covid-19 pandemic, educational institutions, educators, and students suddenly had to adopt distance education without any readiness, and problems were experienced in access and employment of the required equipment, devices, virtual classrooms, and digital course resources.

Before the pandemic, face-to-face education was conducted in environmental design project courses in landscape architecture departments in Turkey, and the students were in the same environment as the teachers, and the instruction was conducted with conventional and digital expression techniques, and the parties communicated constantly. The drafts that the students designed to reflect project ideas were developed based on...
the instructors’ reviews and guidance. Project reviews are easier to conduct in face-to-face education when compared to distance education. However, currently, education has to be conducted online, and student attitudes toward online courses altered the impact of the course on academic achievements.

Environmental design education is instructed in landscape architecture departments in every country, and educators and students have been constantly following the developments in drawing software and employed computers with the most current software. However, in the employment of information technologies, educators and students remained in the same physical environment in constant interaction and communication. Students employed digital tools to express their abstract ideas better in the projects. Also, both conventional methods, that is, drawing with tools such as a ruler, T-square, and pencil on paper in the classroom, and digital drawing were employed predominantly. Although it was less common in the 1st and 2nd years, hand-drawing has been mostly replaced by digital drawing in the 3rd and 4th years. A combination of both methods allowed the students to concretize their imagination. Conventional design techniques (sketches, models), as well as the latest digital design methods (AutoCAD, Architectural Studio (2D), Sketchup, ArchiCAD, Revit, 3D Max, Netcad, Maya, Lumion, Allplan, Adobe Photoshop, etc.), were also employed in distance education. It was observed that digital drawing methods had certain benefits for all stakeholders in distance education. Although these software were beneficial, it was observed that students were not familiar with virtual classrooms, which in turn affected student attitudes and academic achievements. Thus, since both education methods have positive and negative effects on academic achievements in the course, the current study aimed to investigate student attitudes towards distance and face-to-face education methods and the impact of these two education methods on academic achievements in the Environmental Design Project Course instructed by the Department of Landscape Architecture at Karadeniz Technical University after the pandemic (Fig. 3).

Before the Covid-19 pandemic, the course was conducted face-to-face; thus, the study aimed to provide equal conditions for the students who took the course with the two education methods. Both student groups were in the same program. The first group was instructed by a particular faculty member with the face-to-face education method. The second group attended the distance education classes instructed by the same faculty member. Thus, the research problems were determined as follows:

What are the attitudes of Landscape Architecture students toward the instruction of Environmental design project courses with face-to-face and distance education methods?
Is there a difference between the attitudes of Landscape Architecture students towards the instruction of Environmental design project studio course with face-to-face and distance education methods?
What is the impact of these two instruction methods on students’ academic achievements in the Environmental design project course?
Is there a difference between the academic achievements of the students based on the educational method in the Environmental design project course?
**Materials and method**

**Stage 1: Study group**

This stage aimed to determine the differences between student attitudes towards face-to-face and distance education methods. 76 landscape architecture students were female and 54 were male. The same number of students who attended online and face-to-face Environmental design project courses were selected to evaluate both education methods and 18–25 years old 76 female, and 54 male participants, a total of 130 students were assigned.
Stage 2: Study group

The second stage study group included the students who participated in the first stage and the students were divided into control and experimental groups. The experimental group was instructed with the face-to-face education, and the control group was instructed with the distance education method.

In the experimental group, occupant analysis, survey, analysis, requirement list, pre-design, design and detailed project, plans-sections-view development processes included in environmental design studio were conducted with face-to-face instruction method. In other words, the professor and the student developed the environmental design project in collaboration at the same time and place. The Experimental Group included 65 students.

In the control group, the course topic and the weekly course schedule in the syllabus were instructed, similar to face-to-face education. In other words, occupant analysis, survey, analysis, requirement list, pre-design, design and detailed project, plans-sections-view development processes included in environmental design studio were instructed online. How to concretize the abstract ideas of the student about the solution of the environmental design problems were instructed on digital tools and equipment, similar to face-to-face education. However, in distance education, the professor and the student were not in the studio but at different locations. Control Group included 65 students. In other words, the total number of students who participated in the second stage was 130 and 65 students were both in the Control Group and Experimental Group. Student demographics are presented in Table 1.

Development of the questionnaire

Questionnaire

A questionnaire was developed to measure student attitudes. The questionnaire items were determined by interviewing 70 landscape architecture graduates (experts) and the advantages are disadvantages of Face-to-face Education and distance education techniques were discussed with these individuals. In the present study, the questionnaire was developed in four stages: problem definition, item development, and a pilot scheme conducted with landscape architects (experts) for expert opinion. To determine the expert opinions on the validity/reliability of the items, a multiple-choice (2 options: adequate/valid and inadequate/invalid) question form was used. The reliability coefficient of each question was expected to be between 90 and 100%. The items that only 70–80% of the experts considered adequate were revised. Thus, 30 items that aimed to determine the attitudes toward Face-to-face Education and distance education methods were included in the questionnaire. The attitude statements for the FE method were coded with an 'F' and the attitude statements for the OE method were coded with an 'O'. Codes presented below:

| Table 1  | Demographics of the first stage participants |
|----------|-----------------------------------------------|
| Group    | Gender           | Age            |
|          | Male   | Female | 17–20 | 21–25 | 26 and older |
| Experimental group | 29   | 36     | 56    | 7     | 2     |
| Control group     | 25   | 40     | 25    | 36    | 4     |

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(F1/O1): FE/OE contributes to the acquisition of environmental design course objectives.
(F2/O2): FE/OE improves environmental design course achievements.
(F3/O3): The employment of FE/OE in environmental design facilitates learning.
(F4/O4): The employment of FE/OE in environmental design improves student achievement.
(F5/O5): The employment of FE/OE in environmental design improves interest in the course.
(F6/O6): The employment of FE/OE in environmental design improves student creativity.
(F7/O7): FE/OE improves the quality of environmental design.
(F8/O8): The employment of FE/OE leads to a productive environmental design course.
(F9/O9): The employment of FE/OE makes environmental design instruction a pleasure.
(F10/O10): FE/OE is a source of confidence and courage for students.
(F11/O11): FE/OE improves motivation in the environmental design course.
(F12/O12): FE/OE requires student knowledge and skills.
(F13/O13): FE/OE is required for effective environmental design instruction.
(F14/O14): FE/OE significantly reduces the costs associated with the environmental design course.
(F15/O15): FE/OE removes temporal and spatial limitations in the environmental design course.
(F16/O16): FE/OE improves the communication and interaction between the professor and the students and among the students.
(F17/O17): FE/OE improves student socialization in the environmental design course.
(F18/O18): FE/OE allows the instructor to repeat the information as much as needed.
(F19/O19): FE/OE improves equality of opportunity (for students of different age groups or income levels) in the environmental design course.
(F20/O20): FE/OE allows the students to participate in the education whenever they desire in the environmental design course.
(F21/O21): FE/OE leads to extra workload in the environmental design course.
(F22/O22): FE/OE tools and materials are more expensive in the environmental design course.
(F23/O23): FE/OE is a luxury for Turkey in the environmental design course.
(F24/O24): FE/OE is difficult in the environmental design course.
(F25/O25): FE/OE in environmental design is a waste of time.
(F26/O26): FE/OE should not be employed in the environmental design course.
(F27/O27): The employment of FE/OE in environmental design courses is difficult for the students.
(F28/O28): The employment of FE/OE is not necessary for the environmental design course.
(F29/O29): The employment of FE/OE is not necessary to achieve the objectives of the environmental design course.
(F30/O30): FE/OE limits student creativity in the environmental design course.

The achievement test

In this stage, a quasi-experimental study was conducted with the Control Group pre-test, and post-test model to investigate the effects of Face-to-face education or distance education methods in environmental design project courses on the academic achievements of the students. The study was conducted with 130 students, 65 of which was in the Experimental
Group and 65 of which were in the Control Group. Face-to-face education and distance education methods that were employed in the study were considered independent variables. The dependent variable was student achievement. The research design is presented in Table 2.

To determine the impact of the Face-to-face Education and Distance Education techniques on the academic achievements of the students in the environmental design project course, an achievement test that included 50 questions was developed to collect the study data. After the project space is determined in the environmental design project course, the design process includes the sketching, analysis, and development of documents. These phases include certain sub-sections: the provision of base maps, occupant analysis, land survey, requirements analysis, land use, designing form, pre-design, post-design, planting design, details, section views, and presentations. Thus, the 50-question Achievement Test included these topics and focused on the associated skills students need to acquire. These questions were developed based on the views of the faculty members who lectured the environmental design project course. Thus, expert opinions were employed to determine the scope and face validity of the questionnaire and its compliance with the principles of measurement and evaluation. Thus, statistical analyses were conducted on The Achievement Test that included 50 items. The reliability of the 50 items was tested and it was determined that the Cronbach’s Alpha ($\alpha$) coefficient was (0.76), confirming the reliability of the achievement test. The achievement test questions in each topic are presented in Table 3.

The Achievement test was applied as a pretest and a posttest, and each correct answer was scored 1 point. The highest possible score was 50 in the test for 50 correct answers and the lowest possible score was 0 in case all answers were incorrect.

Pre-test and post-test design with control group have two main advantages. Since measurements are conducted on the same subjects, measurements obtained under different experimental processes would be highly correlated in several experiments. This would reduce the error rate and statistical power would increase accordingly. The second advantage is that it requires fewer subjects and would provide speed and less effort since the same subjects are tested in each procedure (Büyüköztürk, 2001).

### Analysis

In the analysis, quantitative data with normal distribution were tested with parametric tests, while quantitative data without normal distribution were tested with non-parametric tests. Parametric tests adopt several assumptions, which vary from test to test, and one of the basic assumptions is a normal distribution. Thus, since the test that would be employed in the study would be determined based on the normal distribution of the quantitative data, the authors paid attention to this issue (Cevahir, 2020). First, the study data were tested

#### Table 2 2th Stage research design

| Group             | Pretest        | Application               | Posttest          |
|-------------------|----------------|---------------------------|-------------------|
| Control group     | Achievement test | Distance education (14 weeks) | Achievement test |
| Experimental group| Achievement test | Face-to-face (14 weeks)     | Achievement test  |
for normal distribution, and it was determined that the data exhibited normal distribution \( p < 0.05 \) (Table 4); thus, parametric tests were employed.

In the first stage, the participants were asked to respond to the questions on a Likert scale. The questions were scored based on a 5-point Likert scale (1 = exactly disagree and 5 = exactly agree). The scale intervals were calculated with the \( a = \frac{\text{series width}}{\text{number of target groups}} \) formula and the options and associated intervals are ‘Exactly Disagree = 1.00–1.79, Disagree = 1.80–2.59, Partially agree = 2.60–3.39, Agree = 3.40–4.19, Exactly Agree = 4.20–5.00’.

In the second stage, the Experimental Group and Control Group were accepted as independent variables in the analysis, and the Achievement Test post-test scores of the students in the Environmental Design Project course were accepted as the dependent variable. Pre-test scores were accepted as the covariance.

In data analysis, one-way ANCOVA recommended to determine statistically significant differences between the groups where there is an independent variable, a dependent variable, and one or more covariates (Kalaycı, 2006), was employed. The pre-test was accepted as the covariate due to the fact that the pre-test could have an effect on post-test scores, the dependent variable. Thus, the problem that could occur in case of inequality between the groups was eliminated.

### First-stage findings

The analysis of the participant views on face-to-face education demonstrated that they strongly agreed with 2 positive attitude items (fe1, fe10), agreed with 13 items (fe2, fe3, fe4, fe5, fe6, fe7, fe8, fe11, fe13, fe16, fe17, fe19, fe20), partially agreed with one item (fe9), and did not agree with 4 items (fe12, fe14, fe15, fe18). In the negative attitude items, it was determined that they agreed with 1 item (fe 21) and disagreed with 9 items (fe22, fe23, fe24, fe25, fe26, fe 27, fe 28, fe29, fe30). In other words, in the survey conducted to determine the attitudes of students towards face-to-face education in the environmental
The attitudes of landscape architecture students towards…

| Table 4 | Tests of normality |
|---------|-------------------|
|         | Group  | Kolmogorov-Smirnov<sup>a</sup> | Shapiro–Wilk |
|         | Statistic | df | Sig | Statistic | df | Sig |
| 1 FE     | 0.241     | 65 | 0.000 | 0.877     | 65 | 0.000 |
| OE       | 0.284     | 65 | 0.000 | 0.804     | 65 | 0.000 |
| 2 FE     | 0.325     | 65 | 0.000 | 0.827     | 65 | 0.000 |
| OE       | 0.297     | 65 | 0.000 | 0.811     | 65 | 0.000 |
| 3 FE     | 0.346     | 65 | 0.000 | 0.790     | 65 | 0.000 |
| OE       | 0.300     | 65 | 0.000 | 0.771     | 65 | 0.000 |
| 4 FE     | 0.181     | 65 | 0.000 | 0.896     | 65 | 0.000 |
| OE       | 0.178     | 65 | 0.000 | 0.892     | 65 | 0.000 |
| 5 FE     | 0.251     | 65 | 0.000 | 0.878     | 65 | 0.000 |
| OE       | 0.236     | 65 | 0.000 | 0.878     | 65 | 0.000 |
| 6 FE     | 0.251     | 65 | 0.000 | 0.866     | 65 | 0.000 |
| OE       | 0.282     | 65 | 0.000 | 0.852     | 65 | 0.000 |
| 7 FE     | 0.253     | 65 | 0.000 | 0.873     | 65 | 0.000 |
| OE       | 0.285     | 65 | 0.000 | 0.830     | 65 | 0.000 |
| 8 FE     | 0.328     | 65 | 0.000 | 0.818     | 65 | 0.000 |
| OE       | 0.334     | 65 | 0.000 | 0.821     | 65 | 0.000 |
| 9 FE     | 0.243     | 65 | 0.000 | 0.878     | 65 | 0.000 |
| OE       | 0.220     | 65 | 0.000 | 0.902     | 65 | 0.000 |
| 10 FE    | 0.333     | 65 | 0.000 | 0.804     | 65 | 0.000 |
| OE       | 0.279     | 65 | 0.000 | 0.790     | 65 | 0.000 |
| 11 FE    | 0.291     | 65 | 0.000 | 0.852     | 65 | 0.000 |
| OE       | 0.270     | 65 | 0.000 | 0.871     | 65 | 0.000 |
| 12 FE    | 0.270     | 65 | 0.000 | 0.835     | 65 | 0.000 |
| OE       | 0.288     | 65 | 0.000 | 0.844     | 65 | 0.000 |
| 13 FE    | 0.290     | 65 | 0.000 | 0.850     | 65 | 0.000 |
| OE       | 0.270     | 65 | 0.000 | 0.866     | 65 | 0.000 |
| 14 FE    | 0.288     | 65 | 0.000 | 0.848     | 65 | 0.000 |
| OE       | 0.273     | 65 | 0.000 | 0.791     | 65 | 0.000 |
| 15 FE    | 0.315     | 65 | 0.000 | 0.752     | 65 | 0.000 |
| OE       | 0.344     | 65 | 0.000 | 0.632     | 65 | 0.000 |
| 16 FE    | 0.338     | 65 | 0.000 | 0.815     | 65 | 0.000 |
| OE       | 0.240     | 65 | 0.000 | 0.807     | 65 | 0.000 |
| 17 FE    | 0.264     | 65 | 0.000 | 0.872     | 65 | 0.000 |
| OE       | 0.252     | 65 | 0.000 | 0.881     | 65 | 0.000 |
| 18 FE    | 0.304     | 65 | 0.000 | 0.853     | 65 | 0.000 |
| OE       | 0.254     | 65 | 0.000 | 0.838     | 65 | 0.000 |
| 19 FE    | 0.287     | 65 | 0.000 | 0.852     | 65 | 0.000 |
| OE       | 0.281     | 65 | 0.000 | 0.815     | 65 | 0.000 |
| 20 FE    | 0.243     | 65 | 0.000 | 0.882     | 65 | 0.000 |
| OE       | 0.263     | 65 | 0.000 | 0.839     | 65 | 0.000 |
| 21 FE    | 0.386     | 65 | 0.000 | 0.747     | 65 | 0.000 |
| OE       | 0.355     | 65 | 0.000 | 0.732     | 65 | 0.000 |
| 22 FE    | 0.314     | 65 | 0.000 | 0.826     | 65 | 0.000 |
| OE       | 0.248     | 65 | 0.000 | 0.844     | 65 | 0.000 |
design education course, the participants stated that they agreed with 15 out of 20 positive attitude items, agreed with 1 out of 10 negative attitude items, and disagreed with 9 items. In the survey conducted to determine their attitudes towards distance education in environmental design course in the department of landscape architecture, the participants strongly agreed with 1 positive attitude item (oe 15), agreed with 4 items (oe4, oe12, oe14, oe18), partially agreed with four positive attitude items (oe5, oe9, oe11, oe17), did not agree with 11 positive attitude items ( oe1, oe2, oe3, oe6, oe7, oe8 oe10, oe13, oe16, oe19, oe20), and agreed with 10 negative attitude items (oe 21, oe22, oe23, oe24, oe25, oe26, oe 27, oe28, oe29, oe30). In short, students agreed with 9 positive attitude items, disagreed with 11 items, and agreed with all 10 negative attitude items towards distance education (Table 5).

After the student attitudes towards both education methods were analyzed for each survey item, the variances, standard deviations, and the reliability analysis for student responses to positive and negative statements are presented in Table 5. Initially, the validity and the reliability of the scale developed to measure the student attitudes towards Face-to-face Education and distance education in the environmental design course, were tested. Of the 30 statements aimed to determine the attitudes towards each training method, 20 were positive and 10 were negative. The internal consistency coefficient for positive statements Cronbach-Alfa (α) was (0.412) and it was (0.752) for the negative statements in the scale developed to measure student attitudes towards Face-to-face Education and distance education methods. Thus, it was determined that the scale was reliable.

To determine the differences between the student attitudes towards Face-to-face Education and distance education in the environmental design course, the analysis of variance was conducted for each statement. Thus, it was determined that there were differences between student attitudes towards all scale items ($p < 0.05$), except 4 and 21 items ($p > 0.05$). The most significant difference was ($F = 281.098$) observed in item 15, followed by items 2 ($F = 102.699$), 14 ($F = 100.427$), and 26 ($F = 99.769$).
Table 5  Positive and negative attitude item responses (x̄: arithmetic mean)

| Descriptives |  |
|---|---|
|  | N | Mean | SD | SE | 95% confidence interval for mean | Minimum | Maximum |
|  |  |  |  |  | Lower bound | Upper bound |
| 1 | F. E | 65 | 3.63 | 1.153 | 0.143 | 3.34 | 3.92 | 1 | 5 |
|  | O. E | 65 | 2.05 | 1.205 | 0.149 | 1.75 | 2.34 | 1 | 5 |
|  | Total | 130 | 2.84 | 1.419 | 0.124 | 2.59 | 3.08 | 1 | 5 |
| 2 | F. E | 65 | 3.94 | 0.998 | 0.124 | 3.69 | 4.19 | 1 | 5 |
|  | O. E | 65 | 2.08 | 1.094 | 0.136 | 1.81 | 2.35 | 1 | 5 |
|  | Total | 130 | 3.01 | 1.443 | 0.127 | 2.64 | 3.14 | 1 | 5 |
| 3 | F. E | 65 | 3.74 | 1.122 | 0.139 | 3.46 | 4.02 | 1 | 5 |
|  | O. E | 65 | 2.05 | 1.217 | 0.151 | 1.74 | 2.35 | 1 | 5 |
|  | Total | 130 | 2.89 | 1.439 | 0.127 | 2.64 | 3.06 | 1 | 5 |
| 4 | F. E | 65 | 3.52 | 1.062 | 0.132 | 3.26 | 3.79 | 1 | 5 |
|  | O. E | 65 | 3.17 | 1.341 | 0.166 | 2.84 | 3.50 | 1 | 5 |
|  | Total | 130 | 3.35 | 1.218 | 0.107 | 3.13 | 3.56 | 1 | 5 |
| 5 | F. E | 65 | 3.42 | 1.236 | 0.153 | 3.11 | 3.72 | 1 | 5 |
|  | O. E | 65 | 2.63 | 1.330 | 0.165 | 2.30 | 2.96 | 1 | 5 |
|  | Total | 130 | 3.02 | 1.338 | 0.117 | 2.79 | 3.26 | 1 | 5 |
| 6 | F. E | 65 | 3.63 | 1.206 | 0.150 | 3.33 | 3.93 | 1 | 5 |
|  | O. E | 65 | 2.42 | 1.198 | 0.149 | 2.12 | 2.71 | 1 | 5 |
|  | Total | 130 | 3.02 | 1.344 | 0.118 | 2.79 | 3.26 | 1 | 5 |
| 7 | F. E | 65 | 3.51 | 1.252 | 0.155 | 3.20 | 3.82 | 1 | 5 |
|  | O. E | 65 | 2.23 | 1.183 | 0.147 | 1.94 | 2.52 | 1 | 5 |
|  | Total | 130 | 2.87 | 1.372 | 0.120 | 2.63 | 3.11 | 1 | 5 |
| 8 | F. E | 65 | 3.55 | 1.146 | 0.142 | 3.27 | 3.84 | 1 | 5 |
|  | O. E | 65 | 2.42 | 1.144 | 0.142 | 2.13 | 2.70 | 1 | 5 |
|  | Total | 130 | 2.98 | 1.276 | 0.112 | 2.76 | 3.21 | 1 | 5 |
| 9 | F. E | 65 | 3.15 | 1.253 | 0.155 | 2.84 | 3.46 | 1 | 5 |
|  | O. E | 65 | 2.65 | 0.991 | 0.123 | 2.40 | 2.89 | 1 | 5 |
|  | Total | 130 | 2.90 | 1.154 | 0.101 | 2.70 | 3.10 | 1 | 5 |
| 10 | F. E | 65 | 3.65 | 1.268 | 0.157 | 3.33 | 3.96 | 1 | 5 |
|  | O. E | 65 | 1.98 | 1.111 | 0.138 | 1.71 | 2.26 | 1 | 5 |
|  | Total | 130 | 2.82 | 1.451 | 0.127 | 2.56 | 3.07 | 1 | 5 |
| 11 | F. E | 65 | 3.48 | 1.264 | 0.157 | 3.16 | 3.79 | 1 | 5 |
|  | O. E | 65 | 2.62 | 1.271 | 0.158 | 2.30 | 2.93 | 1 | 5 |
|  | Total | 130 | 3.05 | 1.334 | 0.117 | 2.81 | 3.28 | 1 | 5 |
| 12 | F. E | 65 | 2.18 | 1.171 | 0.145 | 1.89 | 2.47 | 1 | 5 |
|  | O. E | 65 | 3.58 | 1.286 | 0.159 | 3.27 | 3.90 | 1 | 5 |
|  | Total | 130 | 2.88 | 1.412 | 0.124 | 2.64 | 3.13 | 1 | 5 |
| 13 | F. E | 65 | 3.66 | 1.176 | 0.146 | 3.37 | 3.95 | 1 | 5 |
|  | O. E | 65 | 2.43 | 1.212 | 0.150 | 2.13 | 2.73 | 1 | 5 |
|  | Total | 130 | 3.05 | 1.340 | 0.118 | 2.81 | 3.28 | 1 | 5 |
Table 5 (continued)

|     | N | Mean | SD  | SE  | 95% confidence interval for mean | Minimum | Maximum |
|-----|---|------|-----|-----|----------------------------------|---------|---------|
|     |   |      |     |     | Lower bound                      | Upper bound |
| 14  | F. E | 65   | 2.34 | 1.203 | 0.149 | 2.04 | 2.64 | 1 | 5 |
|     | O. E | 65   | 4.03 | 1.089 | 0.135 | 3.76 | 4.30 | 1 | 5 |
|     | Total | 130 | 3.18 | 1.424 | 0.125 | 2.94 | 3.43 | 1 | 5 |
| 15  | F. E | 65   | 1.92 | 0.989 | 0.123 | 1.68 | 2.17 | 1 | 5 |
|     | O. E | 65   | 4.51 | 0.753 | 0.093 | 4.32 | 4.69 | 1 | 5 |
|     | Total | 130 | 3.22 | 1.565 | 0.137 | 2.94 | 3.49 | 1 | 5 |
| 16  | F. E | 65   | 3.62 | 1.155 | 0.143 | 3.33 | 3.90 | 1 | 5 |
|     | O. E | 65   | 2.12 | 1.281 | 0.159 | 1.81 | 2.44 | 1 | 5 |
|     | Total | 130 | 3.00 | 1.329 | 0.117 | 2.77 | 3.23 | 1 | 5 |
| 17  | F. E | 65   | 3.40 | 1.285 | 0.159 | 3.08 | 3.72 | 1 | 5 |
|     | O. E | 65   | 2.60 | 1.260 | 0.156 | 2.29 | 2.91 | 1 | 5 |
|     | Total | 130 | 3.00 | 1.329 | 0.117 | 2.77 | 3.23 | 1 | 5 |
| 18  | F. E | 65   | 2.54 | 1.200 | 0.149 | 2.24 | 2.84 | 1 | 5 |
|     | O. E | 65   | 3.63 | 1.353 | 0.168 | 3.30 | 3.97 | 1 | 5 |
|     | Total | 130 | 3.08 | 1.387 | 0.122 | 2.84 | 3.33 | 1 | 5 |
| 19  | F. E | 65   | 3.68 | 1.161 | 0.144 | 3.39 | 3.96 | 1 | 5 |
|     | O. E | 65   | 2.08 | 1.122 | 0.139 | 1.80 | 2.36 | 1 | 5 |
|     | Total | 130 | 2.88 | 1.392 | 0.122 | 2.64 | 3.12 | 1 | 5 |
| 20  | F. E | 65   | 3.58 | 1.130 | 0.140 | 3.30 | 3.86 | 1 | 5 |
|     | O. E | 65   | 2.34 | 1.314 | 0.163 | 2.01 | 2.66 | 1 | 5 |
|     | Total | 130 | 2.96 | 1.372 | 0.120 | 2.72 | 3.20 | 1 | 5 |
| 21  | F. E | 65   | 3.78 | 0.992 | 0.123 | 3.54 | 4.03 | 1 | 5 |
|     | O. E | 65   | 4.02 | 1.008 | 0.125 | 3.77 | 4.27 | 1 | 5 |
|     | Total | 130 | 3.90 | 1.003 | 0.088 | 3.73 | 4.07 | 1 | 5 |
| 22  | F. E | 65   | 2.37 | 1.193 | 0.148 | 2.07 | 2.66 | 1 | 5 |
|     | O. E | 65   | 3.52 | 1.404 | 0.174 | 3.18 | 3.87 | 1 | 5 |
|     | Total | 130 | 2.95 | 1.421 | 0.125 | 2.70 | 3.19 | 1 | 5 |
| 23  | F. E | 65   | 2.25 | 1.238 | 0.154 | 1.94 | 2.55 | 1 | 5 |
|     | O. E | 65   | 3.86 | 1.236 | 0.153 | 3.56 | 4.17 | 1 | 5 |
|     | Total | 130 | 3.05 | 1.475 | 0.129 | 2.80 | 3.31 | 1 | 5 |
| 24  | F. E | 65   | 2.32 | 1.133 | 0.141 | 2.04 | 2.60 | 1 | 5 |
|     | O. E | 65   | 4.09 | 0.861 | 0.107 | 3.88 | 4.31 | 1 | 5 |
|     | Total | 130 | 3.21 | 1.339 | 0.117 | 2.98 | 3.44 | 1 | 5 |
| 25  | F. E | 65   | 2.46 | 1.174 | 0.146 | 2.17 | 2.75 | 1 | 5 |
|     | O. E | 65   | 3.62 | 1.259 | 0.156 | 3.30 | 3.93 | 1 | 5 |
|     | Total | 130 | 3.04 | 1.343 | 0.118 | 2.81 | 3.27 | 1 | 5 |
| 26  | F. E | 65   | 2.06 | 1.197 | 0.149 | 1.76 | 2.36 | 1 | 5 |
|     | O. E | 65   | 4.03 | 1.045 | 0.130 | 3.77 | 4.29 | 1 | 5 |
|     | Total | 130 | 3.05 | 1.493 | 0.131 | 2.79 | 3.31 | 1 | 5 |
Furthermore, ANOVA was conducted on the mean student response to positive and negative attitude statements. The findings revealed that there was significant difference ($p < 0.05$) between the mean student attitude towards both education methods. The highest difference ($F = 458.130$) was determined by the negative attitude items. Other findings are presented in Table 7.

**Second stage findings**

The impact of face-to-face or online instruction of the environmental design project course on the academic achievements of the students.

In this section, whether there was a difference between the 2 different education methods conducted with two independent groups, namely the control (distance education students) and the experimental (face-to-face education students) groups, was determined based on student achievements. Different educational methods were implemented in the two groups.

**Table 7** The results of the analysis of variance

|                  | Sum of squares | df | Mean square | F      | Sig  |
|------------------|----------------|----|-------------|--------|------|
| Positive         |                |    |             |        |      |
| Between groups   | 8.923          | 1  | 8.293       | 128.990| 0.000|
| Within groups    | 8.229          | 128| 0.064       |        |      |
| Total            | 16.521         | 128|             |        |      |
| Negative         |                |    |             |        |      |
| Between groups   | 61.480         | 1  | 61.480      | 458.130| 0.000|
| Within groups    | 17.177         | 128| 0.134       |        |      |
| Total            | 78.657         | 128|             |        |      |
However, in both groups, student interest in the environmental design course affected their achievements. Thus, The Achievement test was applied as a pretest at the beginning of the term to measure the student interest in the Environmental design project course before the application. Thus, the model variables were as follows;

- Dependent variable: posttest achievement test scores.
- Independent variables: the groups.
- Covariant: pretest achievement test scores.

The mean achievement test scores for the experimental and control students are presented in Table 7. The mean experimental group score was \(44.4308\) in the achievement test, and the standard deviation was \(3.39\). The average score was calculated as \(44.413\) after covariate correction. The mean control group score was \(40.6308\) in the achievement test, and the standard deviation was \(4.362\). The average score was calculated as \(40.648\) after covariate correction in Table 8.

Analysis of covariance was conducted to determine the effects of Face to face Education and Online Education methods on student achievement in the Environmental design project course. Experimental Group and Control Group were assigned as independent variables, and post-test scores were assigned as dependent variables.

As seen in Table 9, it was determined that the pretest score did not have a significant effect on the groups \(F = 1.041, p = 0.309\); however, there was a significant difference between the mean post-test scores of the Experimental Group and Control Group \(F = 30.06, p = 0.0\).

### Discussion and conclusion

Most studies conducted on distance education in landscape architecture departments during the pandemic in Turkey focused only on student satisfaction (Karadağ and Yücel, 2020) or student attitudes ( Ağır et al, 2007) toward distance education (Durak et al., 2020; Cicekoglu & Akmaz, 2020; Güngör & Sivri, 2020). There are no studies on the comparison of online and conventional education methods or the effect of online education on academic
achievement. Thus, the present study aimed to fill a significant gap in the literature or provide a reference for future studies.

In a study conducted by Güngör and Sivri (2020), the distance education experiences of landscape architecture students were scrutinized. They reported that the students who took online courses for one semester were satisfied with the attitudes of the instructors towards the students, their communications with the instructors, the teaching skills of the instructors, and the online technical infrastructure; however, they still argued that online education was not as effective as the face-to-face method, they experienced resource and data sharing problems, and the method was not as productive. The students emphasized that practical courses should be face-to-face. Thus, the students claimed that despite the proficiency of the instructors, their employment of technology, and distance education infrastructure, distance education was not as successful as face-to-face education (Güngör & Sivri, 2020). This finding was consistent with the present study finding that face-to-face education leads to higher student achievement and interest in environmental design courses when compared to distance education.

In the present study, the students stated that face-to-face environmental design courses increased student creativity, confidence, courage, motivation, and project quality, and believed that the formal course was more productive. A similar finding on course motivation was reported by Kahraman (2020) in the study “The Impact of the COVID-19 Pandemic on Applied Courses and Instruction of These Courses with Distance Education: The Case of Basic Design Course.” In the study, it was argued that distance education led to a lack of motivation, while the teacher motivates the students, and the interaction and motivation were high across the students and in face-to-face education.

In the study "Distance Education at Universities During the Pandemic: An Analysis of Undergraduate Students" by Karadağ and Yücel (2020), it was reported that 63% of Turkish undergraduate students did not have the internet at home, one-third of the students did not have a computer or tablet, and one-fourth of participating students stated that they could not continue education since they did not have internet or computer/tablet, etc. (Karadağ and Yücel, 2020) Similarly, KTU Landscape Architecture students emphasized that the distance education could not provide equal opportunities for students with different income levels in the present study.

In another study conducted to determine the satisfaction of the students with the distance education system in landscape architecture education, the participants stated that they were mostly satisfied with the interest of the instructors, they were not satisfied with the system errors, internet connection problems, and the adequacy of the online education platform for the design course (Düzenli et al., 2022). A study conducted with 121 architecture students in Shiran, Iran investigated the problems experienced by architecture students in online learning during the covid-19 pandemic. In the study, various factors and associated problems such as design process, self-learning, digital sketching, drafting, drawing, modeling and presentation, technical equipment and facilities, and teachers were identified. The authors argued that online education was not pedagogical, and it should be structured differently in architecture education when compared to other undergraduate disciplines. It was emphasized that changes in instructional methods, structural reforms, and educational system improvements were required (Asadpour, 2021). Elrawy and Abouelmagd (2021) emphasized that distance education, which was implemented in architecture education in Egypt after the covid-19 pandemic, was not suitable for the architectural education curriculum, and most courses required constant follow-up in the studio environment. They stated that not all architecture schools were adequately equipped to switch to e-learning in a developing country such as Egypt. In the mixed-method qualitative and quantitative
study conducted with 304 students in 17 schools, the participants stated that studying alone at home negatively affected their motivation, internet problems should be resolved, and an advanced and stable platform should be developed for online virtual classrooms. Roovai and Downey (2010) argued that for a successful distance education program, we should address the issues that hinder this goal. Furthermore, they emphasized that higher education institutions should not consider distance education an easy profit source (Rovai and Downey, 2010). They claimed that the adaptation of old distance education platforms for various professional disciplines would reduce the quality of education. Noble (1998) reported that quality education is labor-intensive and requires significant student–teacher interaction. The author claimed that this could not be possible in distance education. Also, Brinkerhoff and Koroghlanian (2005) reported that student attitudes towards distance education were inconsistent. Similarly, Belcheir and Cucek (2002), Drennan et al. (2005), and Ağır et al. (2007) determined that attitudes towards distance education were negative. These findings were consistent with the attitudes of KTU Landscape Architecture students.

Certain studies reported contrasting findings. In a study based on the assumption that hybrid learning models improve the learning experiences of the students, Poon (2013) claimed that the educational and instructional approaches directly affected and significantly improved the learning experiences of the students in higher education. It was argued that the employment of hybrid methods that include face-to-face and online learning could improve the student perceptions of the learning environment, leading to better study experiences, learning outcomes, and academic achievements. Certain countries developed advanced online platforms and semi-experimental studies were conducted similar to the present study. In a study conducted by Wu et al. (2021) with experimental and control groups on the Video-Based Virtual Reality Learning model that supported the Learning Performance of Landscape Architecture Students during the COVID-19 Period, it was reported that the learning achievements and attitudes of the experimental group students were higher when compared to the control group. Furthermore, it was determined that students required more time to improve self-efficacy and this system did not have an effect on cognitive incompetence. This finding demonstrated that independent of the advancement of the online education platforms, these would be inadequate when compared to face-to-face education (Wu et al., 2021).

In another study where a different perspective was adopted, Saleeb (2021) published the study 'Closing the chasm between virtual and physical delivery for innovative learning spaces using learning analytics based on the assumption that physical presentation techniques should be used in face-to-face education in applied programs such as engineering, architecture, design, and art, while digital presentations should be conducted on virtual 2d and 3d environments and instruments in distance education systems. It was reported that students could use various virtual learning tools in physical learning environments and these tools contributed to student creativity. KTU Landscape Architecture students also stated that face-to-face education improved student creativity more when compared to distance education.

In a study on the perceptions and learning experiences of online education students during the Covid-19 pandemic, Peiman and Kamalipour (2021) reported that student perceptions and learning were significantly affected by online platforms employed in distance education. The study was conducted with the urban design graduate students at Cardiff University in the UK. The study data were collected with an online questionnaire, and the students stated that virtual learning environments did not facilitate effective interaction, and effective communication between two individuals was partially possible, but simultaneous communication across groups was quite difficult. A similar finding was reported in
our study. The participants stated that communication and interaction between the teacher and the student or among the students were effective only in face-to-face education and not possible in distance education. The participants of the study by Peiman and Kamalipour (2021) also stated that live online lectures were more beneficial when compared to pre-recorded lectures. KTU Landscape Architecture students argued that face-to-face education was less time-sensitive. Furthermore, Cardiff University graduate urban design students emphasized that online learning mixed with digital technologies in urban design education and pedagogy required further development and improvement. KTU landscape architecture students stated that the employment of distance education in Turkey was a luxury, face-to-face education should be available, and they preferred the latter.

In the present study, it was determined that the attitudes of the students attending the KTU landscape architecture department in Turkey towards face-to-face education in the environmental design project course were more positive when compared to their attitudes towards distance education. However, they still stated that distance education reduced costs, did not have temporal and spatial restrictions, and they had the chance to watch the lectures as much as they wanted. These findings demonstrated that a more powerful and current educational approach would be possible in landscape architecture departments with a process that would allow the recognition and acquisition of general skills such as manual skills, creativity, and material potential similar to face-to-face education, a methodology that would gradually integrate the technologies or virtual environments in project courses. It could be suggested that this would be possible with the development of current distance education tools. Thus, face-to-face and distance collaboration would be integrated into design education, which would provide an infrastructure for a future switch to distance education.

Another significant finding in the study was that both educational methods affected the academic achievements of the students and there was a significant difference between the academic achievements of the students in the environmental design course instructed with the two educational methods. The academic achievement of the students was higher in face-to-face education when compared to distance education.

The study has certain limitations. The attitudes of the students towards face-to-face and online instruction of a single course were investigated. Future studies could be conducted on all design courses in a particular professional discipline, leading to more comprehensive findings. Future studies could compare the pre-test and post-test achievement scores of the students in various stages of the environmental design course. Further studies on the subject would provide in-depth data for the development of more comprehensive distance education platforms. The advantages and disadvantages of these methods and required improvements should be determined.

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