Towards a Distance Learning Strategy for Architectural Design Subjects: Case Study, Department of Architecture, University of Tripoli

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نحو استراتيجية للتعليم عن بعد لمواضيع التصميم المعماري: دراسة حالة، قسم الهندسة المعمارية، جامعة طرابلس

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Abstract

Distance education was officially and suddenly imposed at all educational levels in Libya, especially in university education, in 2020 due to the spread of the COVID-19 virus. The Department of Architecture at the University of Tripoli encountered many challenges during the spread of the coronavirus (2019-2020) due to the specific nature of teaching its subjects, especially architectural design subjects, which require direct contact between all elements of the educational process (professor, students, and scientific material) inside the design studio. The most prominent problem was how to communicate, discuss, and evaluate the architectural projects given during the two semesters (Spring 2020 - Fall 2020-2021). This research paper aims to investigate how distance education can be adopted as a tool for architectural education in Libyan universities. Therefore, the main question was raised: What is the extent of the possibility of adopting distance learning in architecture departments at Libyan universities? To answer this question and others, a descriptive-analytical methodology was adopted to collect information about the history of distance education in architectural education. In addition, the questionnaire tool was used to investigate the opinions of students and professors about distance education and its effectiveness in teaching architectural design subjects, to come up with an effective strategy and recommendations that may help adopt the distance learning method as part of the learning process in architectural education in architecture departments in Libyan universities.

Keywords: Architectural design, Architectural education, Distance education, COVID-19 virus.

الملخص

فرض التعليم عن بعد رسميًا وبشكل مفاجئ في جميع المراحل التعليمية في ليبيا، وخاصة في التعليم الجامعي، في عام 2020 بسبب انتشار فيروس كوفيد-19. واجه قسم الهندسة المعمارية بجامعة طرابلس العديد من التحديات خلال انتشار فيروس كورونا (2019-2020) نظرًا لطبيعة تدريس مواده الخاصة، وخاصة مواد التصميم المعماري التي تتطلب الاتصال المباشر بين جميع عناصر العملية التعليمية (الأستاذ والطلاب والمادة العلمية) داخل استوديو التصميم. كانت المشكلة الأبرز هي كيفية التواصل ومناقشة وتقييم المشاريع المعمارية المقدمة خلال الفصلين الدراسيين (ربيع 2020 - خريف 2020-2021). تهدف هذه الورقة البحثية إلى دراسة كيفية اعتماد التعليم عن بعد كأداة للتعليم المعماري في الجامعات الليبية. لذلك، تم طرح السؤال الرئيسي: ما مدى إمكانية اعتماد التعليم عن بعد في أقسام الهندسة المعمارية في الجامعات الليبية؟ للإجابة على هذا السؤال وغيره، تم اعتماد المنهج الوصفي التحليلي لجمع المعلومات حول تاريخ التعليم عن بعد في التعليم المعماري. بالإضافة

إلى ذلك تم استخدام أداة الاستبيان لمعرفة آراء الطلاب والأساتذة حول التعليم عن بعد وفعاليته في تدريس مواد التصميم المعماري، وذلك للتوصل إلى استراتيجية فعّالة وتوصيات قد تساعد على تبني أسلوب التعليم عن بعد كجزء من عملية التعلم في التعليم المعماري بأقسام الهندسة المعمارية في الجامعات الليبية.

الكلمات المفتاحية: التصميم المعماري، التعليم المعماري، التعليم عن بُعد، فيروس كوفيد-19.

Introduction

Libya is one of the Arab African countries rich in oil. It is supposed to be positively reflected in all vital sectors of the state, including the higher education sector, which needs to develop its educational infrastructure. Higher education in Libya is considered one of the most important areas influencing the development processes witnessed by the state.

UNESCO defined distance education as a learning process in which the teacher and the learner are separated and the means of communication between them are via electronic communication in a virtual educational environment [1]. Distance education is one of the educational systems that educational institutions resort to in the world when environmental disasters or serious epidemics occur, as happened in 2019 [2].

In early 2020, the coronavirus imposed a massive challenge that the world had to accept, resulting in the need to transition from traditional education to distance education at all levels of learning, especially higher education. Developed countries did not find any difficulties in this transition due to the availability of the infrastructure and the practice of such types of education methods in advance. On the other hand, many third-world countries, including Libya, suffered in adapting to this new circumstance. The conditions and capabilities were not available to transition to e-learning, especially with the frequent power outages, incapacitating Internet service provision. However, despite this, the governments in Tripoli and Al-Bayda imposed on March 14, 2020, the closure of all educational institutions for two weeks and the move towards alternative methods of distance education so that the learning process would not be delayed and all learning tasks assigned to higher education would be completed on time (Author, 2024).

Abdulsattar, G. et al. (2021) indicated that the limited skills of professors and students in dealing with technology, the community's view of distance education, and the lack of confidence in it and its outcomes hurt the adoption of the idea of distance education.

The progress of information and technology has had a significant impact on distance learning and has consequently led to huge changes in the methodology of the educational process and methods of dealing with it. Among the studies that have focused on the distance learning environment and its impact on the educational process is the study The Community of Inquiry, COI, developed by Garrison, Anderson, and Archer (2000) The study (COI) emphasized the provision of the cognitive aspect and social interaction between learners, which are essential elements for the success of the distance learning environment due to their effective impact on building thinking and analysis skills and directing the virtual learning process to achieve the desired educational goals of distance education [3].

The spread of the epidemic posed a problem for the architecture department at Tripoli University, which imposed a new challenge that they had not previously been exposed to.

Research Problem

Third-world countries, including Libya, neglected the importance of benefiting from distance learning technology in the   educational system   until the Corona pandemic came to the world and stopped life in general in all its practical and scientific aspects. Here, the responsible authorities in the Ministry of Education in Libya needed to move quickly towards distance education to avoid stopping the educational process without any equipment or pre-prepared infrastructure. For this reason, the researcher turned her attention to this dilemma to shed light on how it was dealt with and the applied mechanism and to know the challenges and difficulties that faced its adoption as an educational method during the coronavirus pandemic in the Department of Architecture, University of Tripoli, in the subject of architectural design.

Therefore, this research paper presents some aims that work as a guide to help the researcher identify the problems and obstacles that the department faced in adopting distance education in its applied subjects during the Corona 2020 pandemic.

Paper Aims

- To know the extent of the possibility of adopting distance education as a tool for architectural education in Libyan universities.
- To identify the obstacles and challenges that architectural education faced in adopting the idea of distance learning during the Corona pandemic.
- To determine the strategies that help to adopt distance learning in architectural education in Libyan universities.

Questions of the Paper
- What is the extent of the possibility of adopting distance learning in architecture departments at Libyan universities?
- What are the best tools that can be used and have proven successful in distance learning during the Corona period?
- What are the advantages and disadvantages of distance learning in architectural education?
- What are the obstacles and challenges faced by distance learning in the Department of Architecture at the University of Tripoli during the Corona period?

The Methodology Adopted in the Research Paper
This paper relies on a descriptive-analytical methodology to review the literature on the topic to build a scientific foundation that serves as the cornerstone for the field study. One of the key tools used in this research is the questionnaire which contained several questions related to the topic of the research. The software used to analyze the results was Microsoft Excel.

The scientific background of distance learning in architectural science
application of distance learning is not a modern technology in the field of architecture; rather, it was first implemented in the 1960s with the establishment of the first virtual design studio at the University of Illinois and the University of Louisville [4]. The spread of the COVID-19 pandemic forced architecture departments to adopt new methods for conveying scientific information to overcome the outbreak. Therefore, distance learning became the only option for communication and exchanging scientific material. Architectural design materials courses in architecture science do not depend on understanding the relationship between the various functions of the buildings and their technical and performance aspects. They extend further deeply to explore the aesthetic and artistic dimensions. In addition, it requires a different teaching method based on creative, intellectual, mental, and visual communication based on cognitive and creative abilities. Therefore, distance learning must focus on the technological tools used in this application to meet the desired objectives of these courses [5].

With all the previously mentioned points, architectural education has unique characteristics in its educational environment that differ from other disciplines. This imposes a significant challenge in transitioning from traditional education to distance learning which is fundamentally different in all its characteristics and environment. Despite this, the complete shift to distance learning in architectural education and virtual design studios remains a major challenge that drives many researchers to seek solutions and strategies for its implementation in architectural colleges [6]. The study conducted by Hussein, W (2022)[7] concluded that teaching architecture remotely, with all its theoretical and practical components, is not easy and that it is quite challenging to transition entirely to distance learning, especially for design courses, as they require direct communication between the two pillars of the learning process: the professor and the student.

Many studies, including one by Lisa Petrides (2002) [8] have shown that students are more interactive in teamwork through distance learning platforms. One of the criteria emphasized by Unver, E & Sungur, A. (2022) is the interaction between students in the virtual educational environment to improve the quality of the educational process for design subjects. This method enhances the quality of the educational process for design subjects [9]. From this perspective, it is essential to engage students in critiquing the projects of their peers through collaborative assessment, a feature provided by many distance learning platforms.

Distance learning platforms
Distance learning platforms are a group of electronic platforms used for remote communication that operate via the Internet across internet-enabled devices such as computers and mobile phones. These platforms are of foremost importance in supporting and developing the distance learning process by providing opportunities for students, professors, and those interested in science and learning to participate effectively in all different educational activities and by creating spaces for communication, interaction, and knowledge exchange [10].

- **YouTube**

YouTube allows learners to upload scientific materials in video format, which can be watched repeatedly at a later time—one of the platform's most valuable features. In addition to its free quota, it does not require fees to register nor does it require viewer to have an account with it [11].

- **Microsoft Teams**

Microsoft Teams has a significant positive impact on the learning process. This application requires various skills that the user must possess, such as research, critical thinking, social communication, collaboration, and creativity, expressing ideas, and data analysis. Therefore, users should develop their skills to harmonize with the properties of this platform [12].

- **Zoom**

Zoom is classified as one of the applications that has had a significant impact on distance learning and virtual meetings. It supports participation in virtual lectures between the professors and students. In addition, it supports many skills, the most important of which are interaction, discussion, and ease of access to information during the lecture through direct communication via video [13].

All these tools may help to mitigate the obstacles facing the educational process during environmental and health disasters. But with all these developments in digital technology, distance education still has challenges and difficulties in many third-world countries.

Obstacles and Challenges Facing Distance Education in Third-Word Countries

When distance learning was suddenly imposed during the COVID-19 pandemic without prior warning, it presented many challenges and obstacles for both students and professors. These could reduce the value of the scientific material and thus will not achieve its desired goals of the learning outcomes. The researchers Nouraey and Al-Badi 2023) conducted a study on the problems faced by professors and students during the Corona pandemic and the use of the distance education mechanism. They focused on some problems such as **wasted time**, which happens while preparing to connect to the Internet and waiting for all students to join, and inconsistent a**ttendance** of students, who are often unable to attend either because they cannot connect to the network or because they do not have the software programs that support their devices. In addition, students are not asked to turn on the cameras for several reasons: their computers may not have cameras, or, more common among female students, they may not be prepared and prefer to keep the camera turned off. All of this negatively affects students' reception of scientific information. **Low student participation** and the absence of a physical teacher reduces the student's engagement, focus, and motivation to interact with his professor and lessens his academic seriousness. **Student shyness** and their commitment to some religious and cultural beliefs may be reflected in their performance during distance lectures, which may prevent them from practicing some scientific activities that require video calls. There are **difficulties of teaching some applied subjects remotely in architecture education such as architectural design and building construction**. Professors find it difficult to give students some remote notes for some applied subjects, such as architectural design subjects, and laboratory activities that require face-to-face participation. **Physical fatigue** is also a factor, as using computers and mobile phones for extended periods leads to fatigue and stress. This leads to various health problems, some of which may be chronic and require time to recover from [14].

Many researchers spotlighted some technical challenges that distance education has faced. One of them is Shaqour. E. (2021) [15] who listed some challenges, the first being technical challenges, such as electricity and the internet. Many third-world countries suffer from power outages, which lead to instability and weakness of the Internet connection. This causes difficulty downloading programs, applications, and lectures delivered remotely. Psychological challenges include sitting for extended periods in front of computers, which may cause many psychological problems, including boredom, and lack of motivation. Financial challenges also occur as all distance learning applications require students to purchase expensive computers. The student must also have sufficient skills to use these technologies, whether computers or the Internet. This requires enrolling in expensive training courses to develop these skills. Many studies, including a study by the researcher Roma S, (2022) [16], have emphasized developing skills and building some of them, that align with the technical development of distance education, including communication, generating ideas, cooperation, creativity, critical thinking, the ability to plan and manage time, and evaluating levels of scientific work at its various stages [17].

Recently, educational authorities in Libya, have considered distance education as an important part of learning. Distance education at universities should be structured according to its impact on the educational process and outcome. Therefore, the researcher followed up her research with a field study. This supported the notion that distance learning is significant in an education environment which emerged clearly from the literature review. In addition, data was collected from professors and students who have a professional relationship with the field of study.

Field Study

The Department of Architecture and Urban Planning is the first department of architectural education in Libya. It was opened in 1969 and is one of the prestigious departments in the Faculty of Engineering, University of Tripoli. The department seeks to keep pace with technological development in all its educational, scientific, and research stages to catch up with scientific progress, similar to global architectural departments. The coronavirus pandemic imposed on the University of Tripoli the necessity of implementing the distance learning mechanism as a result of the curfew imposed by the Libyan state and the student's failure to attend traditional design studios in light of this pandemic. To find out some information about how this mechanism has been used and the impact of a sudden transition to it, as well as to answer the questions of this paper, random samples were selected from students of the Department of Architecture and some faculty members in the department who carried out the distance learning process during the Corona 2020 period. The number of students participated in the survey was 60. The students' percentage who was interested in the questionnaire and whose answers were completed was 70% or about 42

students out of 60 who contributed to the field study. In addition, 5 faculty members adopted the distance learning mechanism out of 30 professors in the Department of Architecture and Urban Planning at the University of Tripoli.

Questionnaire Structure
The questionnaire was prepared in two versions for students and professors, and each version addressed some important topics that discuss the research problem. The most important topics raised in the questionnaire were applications used in distance education platforms, the effectiveness of these types of modern teaching methods in architectural education, and knowing their pros and cons. Additionally, the survey explored the extent to which design subjects can be taught remotely. It also shed light on the challenges and obstacles faced by both faculty members and students, their evaluation of this experience while applying the distance education mechanism during the coronavirus pandemic period of 2020, and the extent to which this type of distance education can be adopted in architecture departments at Libyan universities.

Smart-Survey program was used to prepare questionnaires of different types. This type of program helps in preparing the questionnaire based on some specifications and information that the researcher enters in advance. One of the most important research stages that the journey of collecting unprepared information went through, quantitative analysis, began with determining the type of information required to formulate the questions that need to be distributed to the targeted samples. This step was followed by collecting the data and then analyzing it statistically using Excel, a technique that contributes to analyzing the data obtained from students and professors to classify it, then discuss it and link it to the study of previous literature to answer the questions of the research paper and produce some strategies and recommendations.

Results
The answers obtained from the targeted samples of students and faculty members were classified into sets related to the research paper questions. This data was entered into the Excel statistical program to obtain percentages that can be compared with other answers on the same axis. The most important axes addressed in the questionnaire are:
• Types of programs used in distance education during the coronavirus period.
• Distance learning and its effectiveness in architecture.
• Teaching architectural design subjects remotely.
• Obstacles faced by students and faculty members while practicing distance learning.

Table No. (1) shows the most important programs used by students and faculty members in distance education during the coronavirus period. Among the most important programs agreed upon by both categories is Microsoft Teams at 100% for faculty members and 70% for students. In addition, the Zoom program at 60% for faculty members and 40% for students. Students indicated high use of YouTube (90%), and faculty indicated use of Slide Share (60%).

Table 1: Types of Programs used.

Program used	Professors	Students
Microsoft Teems	100%	70%
Zoom	60%	40%
YouTube	--	90%
Google Classroom	--	30%
Slide share	60%	--

The professors and students were asked a set of opinions as shown in Table (2) related to the effectiveness of distance education in architecture. Both professors (60%) and students (80%) disagreed that distance education is as reliable and effective as traditional education. Also, professors (80%) and students (40%) strongly disagreed with the possibility of adopting the distance education method in architectural education. 60% of both professors and students disagreed with the readiness of the university's infrastructure to transfer to distance education. Both professors and students fully agreed that distance education is an ideal solution to to avoid disruption of study in the event of environmental or health disasters at different rates of 100% and 60%, respectively. In addition, 60% of the faculty members agreed that students understand, perceive, and participate when receiving the lecture remotely, and 40% of students responded neutrally to understanding, perceiving, and participating when receiving the lecture remotely. The percentages varied between 100-60% of faculty members agreeing on opinions including commitment to lecture time, direct engagement and not being absent, ease of access to information, and encouraging research., On the other hand, 40% of students fully agreed on points such as commitment to lecture time, direct engagement and not being absent, ease of access to information and encouraging research. Regarding the quality of lecture presentations as scientific material through educational platforms, 60% of professors disagreed that the quality was poor, while student perspectives diverged significantly, with only 30% sharing this

view. Unanimously (100%), professors expressed confidence in their ability to manage multiple technologies for distance learning, whereas students demonstrated more uncertainty, with 50% maintaining a neutral stance regarding their proficiency with technical tools.

Table No. 2: Opinions of professors and students about distance education and its effectiveness in architecture.

Subject	%	Opinions (Professors)	NO	subject	%	Opinions (Students)	NO
Distance learning is as reliable and effective as traditional education	60	Disagree	3	Distance learning is as reliable and effective as traditional education	80	Disagree	33
The extent to which distance learning can be adopted in architectural education	80	Disagree	4	The extent to which distance learning can be adopted in architectural education	40	Strongly disagree	17
Infrastructure readiness to transition to distance learning	60	Disagree	3	Infrastructure readiness to transition to distance learning	60	Strongly disagree	25
An ideal solution is to not stop studying in the event of (environmental or health disasters)	100	Fully Agree	5	An ideal solution is to not stop studying in the event of (environmental or health disasters)	60	Fully agree	25
Understanding, perception, and participation when receiving a lecture remotely	60	Agree	3	Understanding, perception, and participation when receiving a lecture remotely	40	Neutral	17
Commitment to the lecture time and direct engagement and not being absent	60	Agree	3	Commitment to the lecture time and direct engagement and not being absent	40	Fully Agree	17
Poor quality of lecture presentation as scientific material through educational platforms	60	Disagree	3	Poor quality of lecture presentation as scientific material through educational platforms	30	Agree	13
Ease of access to information and encourages research	100	Agree	5	Ease of access to information and encourages research	40	Agree	17
The professor's ability to deal with multiple technologies for distance learning	100	Agree	5	Student's ability to use technical tools	50	Neutral	21

Table (3) includes the opinions of some professors and students about teaching architectural design subjects remotely, and their opinions were different. 60% of professors and 70% of students completely agreed on the difficulty of discussing the design stages remotely. The same percentage, 60% for both professors and students, disagreed that the distance learning platform is suitable for different design subjects, as well as developing the technical skills of architectural design students. 60% of professors agreed that distance learning has a positive impact on teamwork among architectural design students, while 30% of students completely agreed. In addition, professors agreed that the diversity of distance learning methods encourages students to integrate into the virtual studio by 80%, while students' opinions were neutral by 30%. 80% of professors and 50% of students did not agree on the effectiveness of discussing architectural sketches and developing them remotely. Also, 60% of professors and students agreed, by 50% on the social interaction between students. All the samples agreed, with 100% of the faculty members and 40% of the students, that distance learning allows students to work at times convenient to them. Both professors, with 100%, and 50% students agreed and committed to submitting the project on time. 60% of the professors agreed that the scientific outcomes of the learning process in its various aspects of distance learning in architectural design subjects are weak. 50% of the students' opinions were neutral about the professor's ability to explain information and help students clarify their ideas.

Table 3: Opinions of professors and students about teaching architectural design subjects remotely.

Subject	%	Professors' opinions	No	Subject	%	Students' Opinions	No
The distance learning platform is suitable for different design subjects	60	Disagree	3	The distance learning platform is suitable for different design subjects.	60	Disagree	25
Distance learning contributes to developing the technical skills of architectural design students	60	Disagree	3	Distance learning contributes to developing the technical skills of architectural design students	60	Disagree	25
It has a positive impact on teamwork among architectural design students	60	Agree	3	It has a positive impact on teamwork	30	Completely agree	13
Difficulty in discussing design stages remotely	60	Agree	3	Difficulty in discussing design stages remotely	70	Completely agree	29
The diversity of distance learning methods encourages students to integrate into the virtual studio.	80	Agree	4	The diversity of distance learning methods encourages students to integrate into the virtual studio.	30	Neutral	13
The effectiveness of discussing and developing architectural sketches remotely	80	Disagree	4	The effectiveness of discussing and developing architectural sketches remotely	50	Disagree	21
Social interaction between students and the professor	60	Agree	3	Social interaction between students	50	Completely agree	21
Allowing students to work at times that suit them.	100	Agree	5	Allowing students to work at times that suit them.	40	Agree	17
Students' commitment to submitting the project at the agreed time	100	Agree	5	Students' commitment to delivering the project on the agreed date	50	Completely agree	21
Weakness of the scientific outcomes of the learning process in its various aspects in distance learning in architectural design subjects	60	Agree	3	The ability of the professor to explain information and help students clarify their ideas	50	Neutral	21

A range of obstacles with varying impacts was presented in Table (4) for both professors and students to gather their opinions on them. Both faculty members, 100%, and students, 70%, fully agreed on the presence of technical obstacles (infrastructure, issues occurring with various devices such as computers and phones, low speed, or internet disconnection). Faculty members agreed, at 80%, regarding psychological obstacles, while students fully agreed, at 40%. Both faculty members, 100%, and students, 40%, agreed that there are communication and concentration issues during lectures. Their agreement percentages on obstacles related to time management and attendance (inability to control the start and end of lectures) differed, with professors agreeing at 60% and students at 30%. Both faculty members and students, 40%, agreed on material obstacles, such as the lack of computers for some students, and the unavailability of necessary materials for models and drawings. Professors, 80%, agreed on the presence of obstacles related to assessment (difficulty in discussing and evaluating design projects online), and 50% of students fully agreed on assessment obstacles (difficulty discussing online). Faculty members, 60%, and students, 90%, agreed on the presence of negative health effects on the body resulting from sitting for extended periods in front of computers and focusing. Faculty members, 80%, disagreed on the presence of obstacles related to skills (weakness in handling technologies and digital software systems), but 40% of students agreed on skill obstacles (lack of computer skills to develop their projects remotely).

Table 4: The obstacles faced by students during distance learning during the coronaviruses period.

Topic	%	Professor's opinion	No	Topic	%	Students' opinion	No
Technical obstacles (infrastructure, issues with various devices such as computers, phones, low speed, or internet disconnection).	100%	Fully agree	5	Technical obstacles (infrastructure, issues with various devices such as computers, phones, low speed, or internet disconnection).	70	fully Agree	29
Psychological obstacles (introversion, isolation, and boredom).	80%	Agree	4	Psychological obstacles (introversion, isolation, and boredom).	40	fully Agree	14
Communication obstacles (lack of student focus and interaction with the presented material).	100%	Agree	5	Communication obstacles (lack of student focus and interaction with the presented material).	40	fully Agree	
Time management and attendance obstacles (inability to control start and end times of lectures).	60%	Agree	3	Time management and attendance obstacles (inability to control start and end times of lectures).	30	Agree	13
Material obstacles ‹(lack of computers for some students, unavailability of necessary materials for models and drawings).	40	Agree	2	Material obstacles ‹(lack of computers for some students, unavailability of necessary materials for models and drawings).	40	fully Agree	17
Assessment obstacles (difficulty in discussing and evaluating design projects online).	80%	Agree	4	Assessment obstacles (difficulty in discussing and evaluating design projects online).	50	fully Agree	21
Negative health effects on the body due to sitting for long periods in front of the computer and concentration.	60%	Agree	3	Negative health effects on the body due to sitting for long periods in front of the computer and concentration.	90	fully Agree	38
Skill obstacles (weakness in handling technologies and digital software systems).	80%	Disagree	4	Skill obstacles (weakness in handling technologies and digital software systems).	40	Agree	13

Discussion

1- First Topic: Types of Programs and Applications Used in Distance Learning During the COVID-19 Period.

Figure (1) illustrates the analysis of the data collected from samples regarding the most important applications used by students and faculty members during the COVID-19 period, which they are still using. YouTube, Microsoft, and Zoom were reported by students and professors as being used in different percentages, starting from 40% to 100%. This reflects their various properties, such as the ability to download lectures and participate in lectures live without direct physical interaction. According to the literature review, many researchers, such as Wulandari, (2022), Haidar, A (2022), and Laili, R. (2020), focused on the importance of distance learning platforms and their features, such as being free to use, though they depend on an internet connection. Using these, students can download videos related to the required study material and watch them at times that suit them. These applications require various skills from users including critical thinking, social communication, expressing ideas, and data analysis. They concluded that Zoom supports many essential skills, most notably interaction and discussion during lectures through direct video communication.
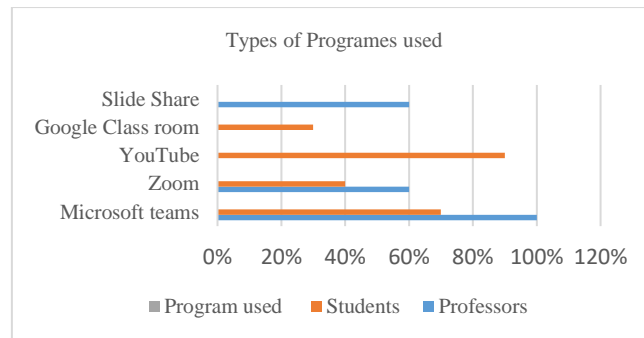
Figure 1: Types of Programs used.

2- Second Topic: Remote Learning and Its Effectiveness in the Field of Architecture

Remote learning is considered one of the modern programs that has gained widespread use due to the rapid development and expansion of digital technology in recent years. Professors and students fully agree that remote learning is an ideal solution to ensure that education does not stop or get interrupted during environmental or natural disasters. This aligns with what Somaieh (2023) viewed, that remote learning is an ideal solution for crisis management in educational institutions. Both samples (students and professors) agreed on some of the outcomes of remote learning, such as understanding and participation when attending lectures, diligence in attending sessions, and the ease of accessing information through the Internet. But, on the other hand, neither students nor faculty members agreed on adopting remote learning as a permanent substitute for traditional architectural education. This was due to a lack of prior knowledge of remote learning, insufficient digital skills to work with the technology, and weak infrastructure, all of which are factors that hinder the implementation and effectiveness of remote learning. Furthermore, there is a lack of confidence in the academic outcomes of remote learning, as Abdulsattar (2021) pointed out. Faculty members disagreed with the perception of poor quality in lecture presentations through online platforms, as they are the presenters, not the recipients, and they do not experience the quality of delivery firsthand. In contrast, students agreed with the view that the quality of the material presented was poor. Shaqour (2021) attributed this to frequent power outages and weak infrastructure, which are the main factors affecting remote learning programs.
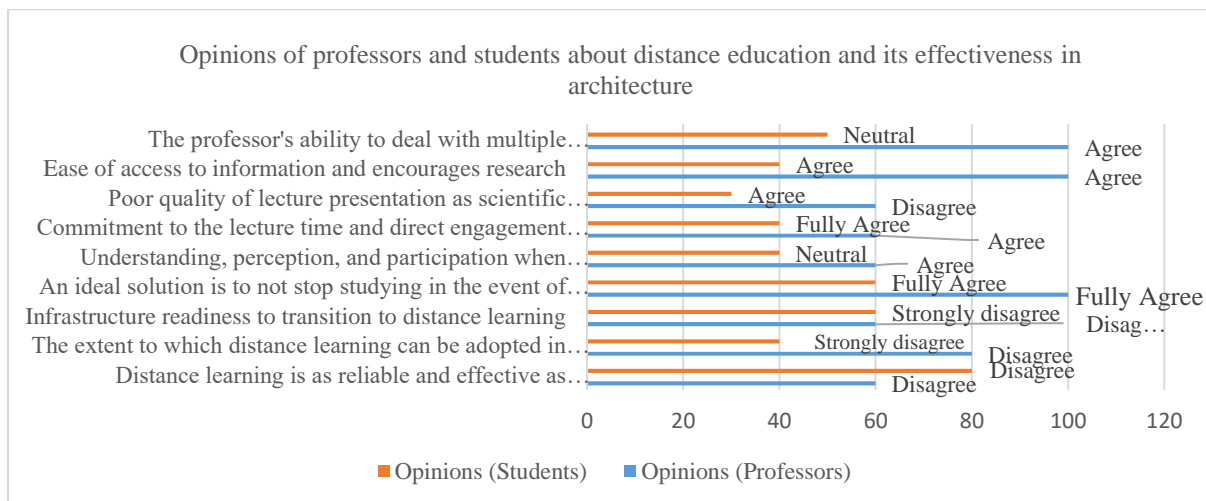

Figure 2: Opinions of professors and students about distance education and its effectiveness in architecture.

3. Third Axis: Teaching Architectural Design Subjects via Distance Learning

Distance learning for architectural design subjects has some advantages, including allowing students to work at times convenient for them. In addition, the positive effects were reflected in the students' commitment to submitting their design projects within the set deadlines. Both students and professors emphasized, the interaction among students through distance learning platforms, which aligns with the findings of several studies, including one conducted by Lisa Petrides in (2002), which indicated that students are more interactive and engaged with one another on distance learning platforms. Both students and professors agreed on the positive effects of distance learning on teamwork among architectural design students. This was further highlighted by Unver and Sungur

(2022), who emphasized that interaction and teamwork among students in the virtual learning environment are crucial for improving the quality of the educational process in design subjects. Based on this it is essential to involve students in the evaluative process of submitted projects through collaborative assessment work, which is one of the key advantages of distance learning platforms.

The students' opinion was neutral, unlike the professors' opinion, who agreed that the diversity of distance learning methods encourages students to integrate into the virtual studio. This kind of studio provides flexible scientific material in which the architecture student receives different types of knowledge. In addition, developing cultural interaction teaches collaborative design outside the physical and temporal boundaries of traditional design studios. And also, improves their awareness, scientific skills and abilities outside these boundaries, which was focused on by Baktash (2015).

The professors and students did not agree that distance learning contributes to developing students' technical skills in architectural design, which is consistent with what (Abdulsattar. G et al 2021) indicated in their research that the sudden introduction of distance learning systems without prior preparation has a negative impact on the learning process. One of the most important of these problems is the low level of skills for students, and sometimes for professors, in dealing with distance learning tools.

Professors agreed on the weakness of the learning process outcomes through distance education, while students' opinions were neutral to this opinion. (Abdulsattar. G et al. 2021) suggested that this weakness is related to weak internet services, lack of control over starting the lecture at the specified time remotely, weak infrastructure, frequent power outages, difficulty in attracting students' attention and maintaining their focus during the lecture, and the lack of a clear mechanism for registering students collectively. Both professors and faculty members did not agree on the effectiveness of discussing architectural sketches remotely because it requires the physical presence of each of them so that the professor can give feedback clearly and effectively. Therefore, each of them agreed on the difficulty of discussing the design stages remotely due to the presentation, discussion, and evaluation they require. Neither professors nor students agreed on the suitability of distance learning for architectural design courses due to the specificity of this type of scientific material in education. Both Unver and Sungur(2022) and Cho, Lee.and Kim(2022) indicated that the teaching mechanism in architectural design depends on the theoretical and applied method, direct interaction between professor and student, and cooperative learning between students. In addition, teaching architectural design requires teaching students logical, reflective, and critical scientific thinking to solve any architectural problem, which requires the presence of both students and professors in the same physical educational environment.
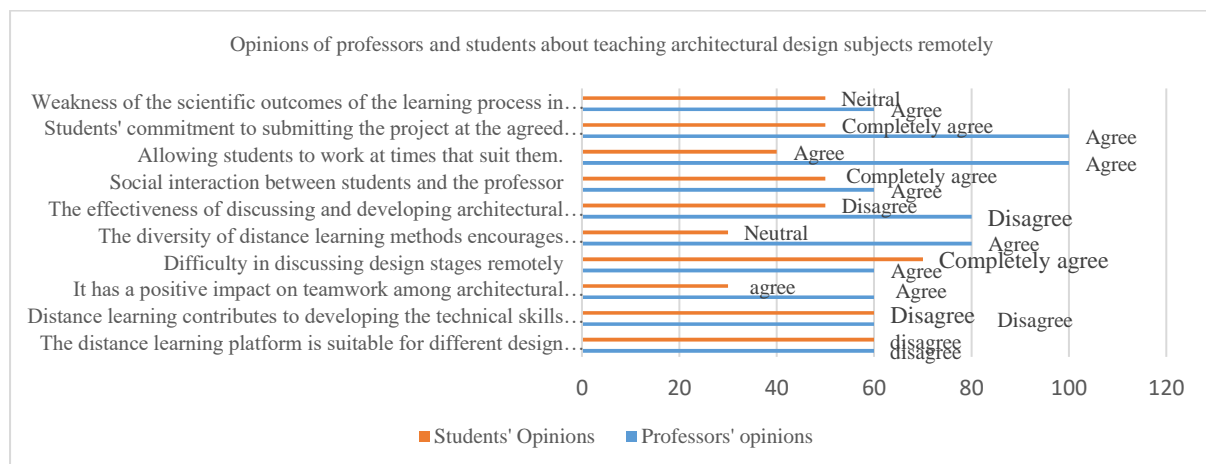

Figure 3: Opinions of professors and students about teaching architectural design subjects remotely.

4- Fourth axis: Obstacles faced by students and faculty members while practicing distance learning.
<u>Technical obstacles:</u> One of the most important obstacles faced by both professors and students, as shown in Figure (4), was technical challenges (infrastructure, technical problems in various devices such as computers, phones, low speed, or interruption of Internet service). Professors expressed facing them at a high rate, representing 100% of the sample, while for students it was 70%. These percentages reflect their agreement on the poor and dilapidated infrastructure. In addition to, the limited financial income of professors and the lack of it among students **combined with** their large financial obligations, sometimes stand as an obstacle to purchasing advanced devices that **support** some distance learning programs and applications. Shaqour (2021) **described** the problems and challenges suffered by all third-world countries, and Libya is one of them, including power outages,

which in turn lead to instability and weakness of the Internet connection, and thus the inability to download programs and applications and attend lectures at specified times.

Psychological Obstacles: Shaqour (2021) stressed in his research paper that prolonged use and isolation of computers may negatively affect students' well-being, causing potentially serious psychological disorders. This was in complete agreement with the opinions of both professors, 80%, and students, 40%, about the psychological problems that students and sometimes professors are exposed to, including isolation, and boredom.

Communication Obstacles: Professors pointed out several barriers to communication, the most significant of which was the students' lack of focus and engagement with the course material, due to their inability to separate the study environment from the home environment. This was a reaction to the absence of a professor in front of them to capture their attention and motivate them to participate. These opinions align with the study conducted by Nouraey and Al-Badi (2023), which indicated that the lack of a professor in a physical educational environment reduces the student's participation, focus, and motivation to interact with their instructor, leading to a lack of academic seriousness.

Time and attendance management obstacles: Both professors and students highlighted the challenges of controlling the start and end times of lectures, as well as the lack of commitment by some students to attend online lectures on time. This corresponds with the findings of the study by Nouraey and Al-Badi (2023), which indicate that the time spent waiting for students to join the lecture, along with weak internet connections and interruptions during the session, all contribute to wasting the allocated time for remote lectures. It is also noteworthy that some students miss lectures for various reasons, such as being unable to connect to the internet or not having the necessary software for their devices. Additionally, students are not required to turn on their cameras for several reasons, including the possibility that their computers lack cameras or, in the case of female students, the more common reason being that they may not feel prepared, so they prefer to keep their cameras off. All of this negatively impacts the students' ability to receive the course material due to the lack of direct interaction.

Material obstacles: Both professors and students agreed, with the same percentage of 40%, on the material barriers. Among these barriers that have adverse effects on distance learning outcomes is the lack of computers for some students,in addition, the unavailability of necessary materials for models and drawings, and the absence of some digital programs that require advanced skills. All these electronic devices and digital programs have a high financial cost that exceeds the financial capacity of students. This was confirmed by Shaqour (2021), who stated that all distance learning applications require students to own expensive computers. Furthermore, students must possess the necessary skills to use these technologies, whether a computer or the internet, and this requires engaging in expensive training courses to enhance their skills in dealing with such technologies. Therefore, the Libyan authorities must provide a student grant specifically for the electronic equipment required for students' studies, which they would receive monthly to ease the burden on parents and students.

Evaluation Obstacles: Professors see that there are difficulties when discussing or evaluating projects for design subjects, as 80% of them agreed with them. This is consistent with what was stated by researchers Nouraey and Al-Badi (2023), who confirmed the inability to teach some applied subjects remotely. The professor finds it very difficult to give some remote notes for some applied subjects, such as architectural design subjects in architecture and laboratory activities that require face-to-face participation. This is what 50% of students completely agreed with. These difficulties may result from several factors, including technical and performance issues, such as the lack of understanding of sketches provided by the professor based on the software or application they are using. Additionally, there is a challenge of direct communication for conveying and receiving feedback on the design project.

Negative health effects: 60% of professors and 90% of students agreed on the negative health effects on the body resulting from sitting for extended periods in front of the computer, as well as some health complications that are associated with prolonged periods of concentration. This is what Nouraey (2023) explained, mentioning problems and physical stress when using electronic devices of different types, which leads to fatigue and thus results in various health problems, some of which may be chronic and require time to recover from.

Skills Obstacles: Working on building human wealth is extremely important because it has a significant impact on scientific development. One of the most important skills is that university professors must keep pace with technological and information development at all levels, required by their scientific job needs. Therefore, 80% of professors did not agree on skill obstacles (weakness in dealing with technologies and digital software systems),

as they stressed that these required skills are among the basics that must be available to faculty members. Many studies, including a study by Krzyżak, et al. (2023), have confirmed the importance of developing students' various skills, whether technical, informational, or intellectual, including generating ideas, the ability to plan and manage time, and evaluating levels of scientific work at its various stages. Therefore, 40% of students agreed that there is a weakness in different skills for students, and they should work to develop their capabilities to meet their individual needs and to keep pace with the requirements of distance learning.
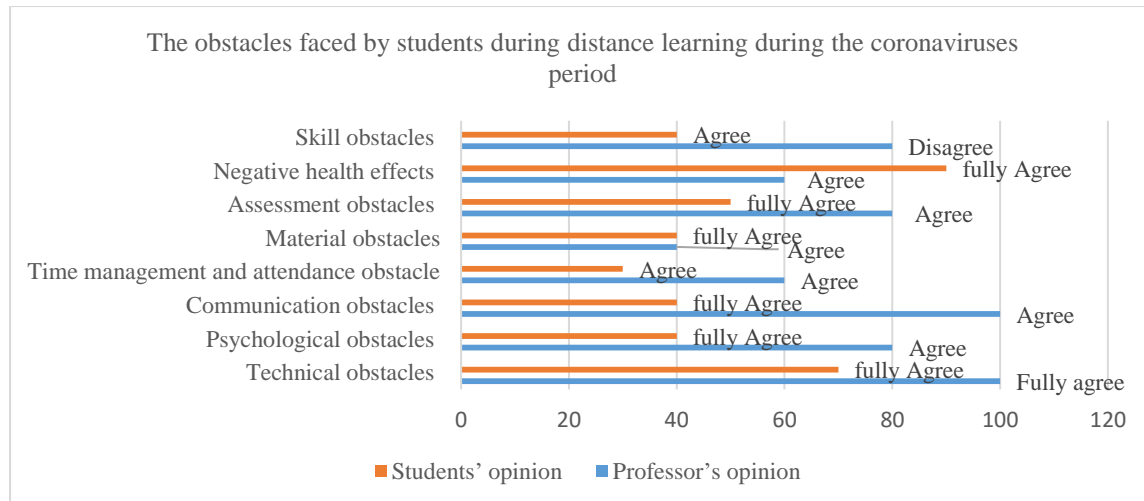

Figure 4: The obstacles faced by students during distance learning during the coronaviruses period.

Conclusion

In early 2020, the COVID-19 pandemic imposed a huge challenge that the world had to accept, necessitating the transition from traditional education to remote learning at all levels of education, particularly higher education, across the globe. Many third-world countries, including Libya, struggled to adapt to this new circumstance, as the conditions and capabilities were not available to move to e-learning, especially with the frequent power outages which lead to Internet disruptions. However, the governments in Tripoli and Al-Bayda imposed on March 14, 2020, the closure of all educational institutions for two weeks and shifted towards alternative methods of distance learning to ensure that the educational process would not be delayed and all academic tasks in higher education would be completed on time. Architectural education is one of the important educational pillars in higher education. It is distinguished by the specificity of its educational process for its applied subjects, especially architectural design, which require a different teaching method based on creative, intellectual, mental, and visual communication based on the cognitive and creative abilities of the students. In addition, the specialized teaching staff provides continuous informational and scientific feedback throughout the semester. However, despite all this, the COVID-19 challenge forced architecture departments in universities worldwide to shift their design studios, particularly architectural design subjects, to virtual studios via the Internet. This precautionary measure faced some challenges and difficulties that were reflected in the outcomes of the educational process in architectural design subjects.

By highlighting several pieces of literature review and analyzing the views of professors and students, it is possible to answer the research paper's questions.

♦ **What is the extent of the possibility of adopting distance learning in architecture departments at Libyan universities?**

Teaching architecture with all its theoretical and applied parts remotely is not an easy task. It is difficult to completely transition to distance learning, especially design subjects that require direct communication between the most important pillars of the learning process: the professor and the student. Therefore, distance learning cannot be adopted as a substitute for traditional architectural education due to the lack of prior knowledge of remote learning tools the availability of the necessary skills to deal with digital technology, and the weakness of the infrastructure with all its components. All of these are influential factors in the effectiveness of applying distance learning and the lack of confidence in its scientific outputs. However, on the other hand, distance learning is considered an ideal solution to prevent the study from stopping and being obstructed during environmental, natural, and health disasters.

- ♦ **What are the best tools that can be used and have proven successful in distance education during the coronavirus period?**

The Microsoft Teams application is one of the applications provided by the University of Tripoli for free to its students and professors. Most lectures are downloaded through this application; however, it requires several skills that the user must possess. The YouTube application is more commonly used by students for its features, such as being free, and the ability to download videos related to the required scientific material and watch them at times that suit the student. The Zoom application is classified as one of the applications that have a significant impact on distance education due to its importance in facilitating participation in synchronous lectures without direct physical contact between participants, and it also supports many skills, the most important of which is interaction and discussion during the lecture through direct communication via video.

- ♦ **What are the advantages and disadvantages of distance learning in architectural education?**

The most important advantages:
- Distance learning is an ideal solution to prevent the study from stopping and being disrupted during environmental and natural disasters.
- Ease of access to information through the information network.
- The possibility of developing students' skills and acquiring new abilities for self-development.
- Allowing students to work at times that suit them, in addition to the positive effects, that were reflected in students' commitment to submitting their design projects in the subject of architectural design on time.
- Interaction between students through distance learning platforms and its positive effects on teamwork between architectural design students due to its impact on improving the quality of the educational process for design materials. From this standpoint, students must be integrated into the evaluation process of submitted projects through group evaluation work.
- The diversity of distance learning methods encourages students to integrate into the virtual studio to become a flexible scientific platform in which the architecture student receives all different types of knowledge through developing cultural interaction and teaching collaborative design outside the physical and temporal boundaries of traditional design studios to advance their awareness and build their skills and scientific capabilities beyond these boundaries.

The most important disadvantages:
- The sudden usage of distance education systems without prior preparation has a negative impact on the outcomes of the learning process. One of the most prominent issues is the low level of skills for students, and sometimes for professors, in dealing with distance education tools.
- The inability to adopt distance education as an alternative to traditional architectural education. This is due to the lack of prior knowledge of distance education, the lack of availability of the necessary skills to deal with digital technology, and the weakness of the infrastructure. All these factors influence and hinder the application and implementation of the mechanism of distance education, leading to a lack of confidence in its academic outcomes.
- The inappropriateness of distance education for architectural design subjects: This type of scientific subject has specific educational characteristics, and the mechanism of education depends on some methods, such as theoretical and practical methods, direct interaction between the professor and the student, and cooperative learning between students. In addition, teaching architectural design requires teaching students logical, reflective, and critical scientific thinking to solve any architectural problem, which requires the presence of both students and professors in the same physical educational environment.
- The wasted time due to preparing for an internet connection and waiting for all students to join: Sometimes, some students cannot join due to a lack of the necessary software on their devices, in addition to the weak network connection and interruptions. All of these lead to the waste of time allocated for the lecture.
- Lack of effective participation from students: The absence of face-to-face interaction with the professor reduces student participation, focus, and motivation resulting in less academic seriousness. Moreover, such behaviors can negatively affect the student's social behavior, making them more isolated.
- Shyness and adherence to religious and cultural beliefs affecting student performance: Some students' shyness or adherence to religious and cultural beliefs can affect their performance during remote lectures. This may prevent them from engaging in scientific activities that require video calls or sending messages to professors or colleagues.

- The inability to teach some applied subjects remotely: The professor finds it very difficult to give some notes remotely for some applied subjects such as architectural design subjects due to the need for presentation, discussion, and evaluation, as well as laboratory activities that require face-to-face participation.
- Physical fatigue: Prolonged use of computers and mobile phones leads to fatigue and stress, which may cause various health problems, some of which could become chronic and require recovery time.
- Inferior quality of lectures through online platforms: The continuous power outages and weak internet connections, which are essential for running remote learning programs, lead to inadequate quality of lecture delivery.

♦ **What are the obstacles faced by distance learning in the Department of Architecture at the University of Tripoli during the coronavirus period?**

Technical obstacles: One of the most important obstacles, faced by professors and students was the technical challenges (infrastructure, technical problems in various devices, computers, phones, low speed or interruption of Internet and electricity service). Power outages play a major role in the instability and weakness of the Internet connection, and thus the inability to download programs and applications and attend lectures on time.

Psychological obstacles: Extended periods spent alone with computers may negatively affect the student's behavior, causing psychological illnesses that may be serious. These issues include withdrawal from family, isolation, and boredom due to their lack of social interaction with others.

Communication obstacles: Students' lack of focus and interaction with the given scientific material is a result of their inability to separate the study environment from the home environment. This issue arose as a reaction to the traditional educational environment's absence to draw their attention and motivate them to participate.

Time and attendance management obstacles: Incapability to control the start and end of the lecture. This is related to several reasons such as some students' failure to adhere to the lecture time via the Internet, their inability to connect to the network, and their failure to acquire devices that support used software.

Material Obstacles: The obstacles that negatively affect distance learning are the lack of computers among some students and the unavailability of materials required for models and drawings. In addition, certain digital software demands high skills. These programs are costly and exceed the financial capabilities of some students. **Evaluation Obstacles**: The professor finds it very difficult to give remote feedback on some applied subjects, such as architectural design subjects and laboratory activities, that require face-to-face participation. These difficulties may be the result of several reasons, including technical and performance-related reasons, such as not understanding the sketches that the professor creates according to the program or application he uses.

Negative Health Effects: Many negative health effects on the body result from prolonged lengthy periods of sitting at the computer. Additionally, some health issues arise from focusing for extended periods, which require extended time to recover from.

Skills Obstacles: The improvement of students' various skills, whether technical, informational, or intellectual, including generating ideas, the ability to plan and manage time, and evaluating the levels of academic work at its various stages is almost important. Therefore, we must work to develop their abilities to meet their individual needs and keep up with the requirements of distance learning.

Strategies for adopting distance education in architectural education in Libyan universities

1. **Upgrading the infrastructure**

To keep up with distance education, various infrastructures must be developed for investment in human resources development and smooth access to the multiple databases of digital information, which should be provided free of charge to all those who wish to use them and linked to all electronic applications.

2. **Motivation for virtual participation**

Exposure to many problems is a great challenge in motivating students to participate and challenge all kinds of obstacles. This will help students overcome their shyness and introversion by providing them with the knowledge that supports the development of their abilities and skills.

3. Knowledge inventory and self-development

Developing students' abilities and skills is one of the most important requirements of distance education, which helps them in scientific research, increasing information inventory, and building knowledge. Self-development comes by keeping pace with all advanced technologies, applying and testing them, and adopting what is in line with the advanced learning process. In addition, there needs to be a focus on group learning to improve and raise the level of personal skills and build human cadres for the country's future.

4. Interactive Problem-Based Learning

The diversity of distance learning methods encourages students to interact and integrate into virtual studios to become a flexible scientific platform in which the architecture student receives all different types of knowledge through developing cultural interaction and teaching collaborative design outside the physical and temporal boundaries of traditional design studios to advance his awareness and develop his skills and scientific capabilities beyond these boundaries. This type of education provides students with logical, reflective, and critical scientific thinking to solve any architectural problem by integrating students into the evaluation process of design projects using the method of group evaluation.

Recommendation

♦ This research paper is considered a rich source of information on distance education for officials and decision-makers in higher education and academics in architecture and urban planning departments in Libya to identify, evaluate, resolve, and overcome obstacles to ensure a smooth transition to distance education and raise the level of education in Libya.

♦ Develop the infrastructure of Libyan universities and overcome the occurrence of technical problems in various electronic devices.

♦ Develop the skills and capabilities of both students and professors by providing several supportive and awareness-raising courses and lectures on how to use and deal with all data of digital technology and distance education in particular.

♦ The possibility of a complete shift to distance education in architectural education and virtual design studios requires the motivation of many researchers to find solutions and strategies for its implementation.

♦ Provide Internet service and all electronic programs and platforms and their applications and electronic tools such as computers free of charge for all categories of the educational process from students and professors to support and develop the distance education process in cases of natural and health environmental disasters.

♦ Provide financial grants allocated for electronic equipment for students and professors monthly to reduce the financial burden.

♦ It provides some distance learning strategies to build different skills that contribute effectively to building the self, generating ideas, interaction, the ability to plan and manage time, and evaluating the levels of scientific work at its various stages.

♦ Integrating students into the evaluation process of the design projects submitted through group evaluation work is one of the most important advantages of distance learning platforms.

Ethics Statement

This research was conducted in accordance with the ethical standards of Tripoli University and comparable ethical standards. Informed consent was obtained from all individual participants included in the research. All data were anonymized to protect participant confidentiality.

No animals were used in this research. The author declares that she has no conflicts of interest related to this research.

Authorship Contribution Statement

Dr. Mariam MT Shibub writes all the parts of the research paper, including (Research paper structure and design, review and writing of the scientific article, methodology, data collection and analysis, discussion and conclusion, strategy, and recommendations).

Declaration of Competing Interest

Acknowledgment

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