

Impacts of E-learning on the Efficiency of Interior Design Education (A comparative study about the efficiency of interior design education before and during the novel Coronavirus (COVID-19) pandemic)

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Abstract

Background and problem of study: The sudden adoption of online education during the COVID-19 pandemic has presented numerous obstacles and challenges to the educational process at universities, particularly for applied disciplines that heavily rely on practical activities and direct interaction between teachers and students. As online education, in the form of blended learning, has continued partially even after the pandemic, it became crucial to conduct an in-depth study and evaluation of this method of education.

Objectives: The importance of evaluating online education for practical subjects in the field of interior design and understanding its impact on student outcomes' effectiveness. By comprehending this impact, it becomes possible to identify methods for evaluating and enhancing the quality of this type of education.

Methods: A comprehensive evaluation and analysis of the learning outcomes of 47 students were conducted to measure and compare their efficiency. The research adopted a case study approach to examine the effectiveness of the instructional methods employed.

Results: The research adopted a case study approach to examine the effectiveness of the instructional methods employed. By examining the outcomes of these students.

Conclusions (Recommendations and contributions): The study recommends maintaining distance learning between the teacher and the student during face-to-face education. It also recommends creating platforms for educational and virtual laboratories to be used when needed.

Key words

Design Concept, Interior Design, Learning Outcomes, Rubric, Spatial Planning and Visualization, Teacher Presence.

التعليم الإلكتروني وأثره على كفاءة تعليم التصميم الداخلي (دراسة مقارنة لكفاءة تعليم التصميم الداخلي قبل وخلال جائحة كورونا)

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الملخص

خلفية الدراسة ومشكلتها: أدى الفرض المفاجئ للتعليم الإلكتروني خلال جائحة كورونا إلى ظهور معوقات وتحديات للعملية التعليمية في الجامعات وخصوصاً للتخصصات التطبيقية والتي تعتمد على المراسم والاتصال المباشر بين المدرس والطالب، ونظراً لاستمرارية التعليم الإلكتروني بشكل جزئي بعد الجائحة على شكل التعليم المدمج، فإنه كان من المهم التعمق في دراسة وتقييم هذه الطريقة في التعليم.

الأهداف: أهمية تقييم التعليم الإلكتروني للمواد العملية في تخصص التصميم الداخلي ومعرفة أثرها على كفاءة مخرجات الطلاب، حيث يساهم فهمها في تحديد طرق لتقييم ورفع جودة هذا النوع من التعليم.

الطرق المستخدمة: إجراء تقييم وتحليل لنتائج 47 طالباً لقياس كفاءتهم ومقارنتها، اعتمد البحث منهج دراسة الحالة من أجل فحص فعالية الأساليب التعليمية المستخدمة لنتائج الطلبة، لتحليل بيانات الدراسة تمت مقارنة النتائج من أجل تقييم شامل لكفاءة نتائج التعلم.

النتائج: تم الحصول على رؤية قيمة حول فعالية مناهج التدريس وتأثيرها على تعلم الطلاب.

الاستنتاجات (التوصيات والمساهمة): أوصت الدراسة بالحفاظ على التعلم عن بعد بين المعلم والطالب أثناء التعليم وجهًا لوجه. كما توصي بإنشاء منصات للمختبرات التعليمية والاقتراضية لاستخدامها عند الحاجة.

الكلمات المفتاحية

التخطيط الفراغي والإظهار، التصميم الداخلي، تقييم روبريك، حضور المعلم، الفكرة التصميمية، مخرجات التعليم.

Introduction

The COVID-19 pandemic has compelled educational institutions worldwide to undergo a drastic transformation in their instructional methods, shifting from traditional face-to-face teaching to distance learning. In response to this unforeseen shift, universities have made significant efforts to adapt to the new online learning environment by utilizing various digital platforms. However, this transition has presented several challenges, including the maintenance of high-quality education, which is essential for effective teaching and learning processes (Nugroho, Anifah, Sulistiyo, Cahyaningtias, & Firmansyah, 2021).

To ensure students achieve the desired learning outcomes in their respective subjects, research has extensively explored distance and online learning, examining their different forms and effectiveness. For instance, studies have demonstrated that both instructors and students expressed satisfaction with distance learning, particularly in theoretical courses (Fallatah, 2021).

However, research has indicated that educators and students face challenges in the distance learning process when it comes to applied subjects, including interior and architectural design courses that rely on practical instruction in studio settings. These challenges arise due to factors such as limited direct interaction between educators and students, unclear evaluation methods, and a lack of alternative teaching approaches (Lassoued, Alhendawi, & Bashitialshaaer, 2020).

As a result, this research aims to assess the quality of learning in a specific interior design subject by evaluating and analyzing students' learning outcomes. The findings and recommendations of this study will contribute to a better understanding of the situation for interior design students and inform future distance education approaches in the field of interior and architectural design.

Importance of the Study:

The global changes resulting from the COVID-19 pandemic about the behaviors of individuals and the way individuals meet and communicate have had a significant impact on most of the sectors. (Burrows, 2021) The application of e-learning has resulted in several obstacles

and challenges for the educational process in universities, especially for the applied disciplines that depend on Design Studios and direct communication between teachers and students. After the pandemic, and due to the partial continuity of e-learning in the form of hybrid education, it became important to delve into the study and evaluation of this educational method. This importance is special for practical subjects in applied disciplines, such as interior design.

The Issue Tackled by the Study

The pandemic, at its beginning, imposed the full lockdown of various sectors, the most important of which is the educational sector in Jordan. (World Bank, 2020) Accordingly, there was a need to search for methods and solutions to proceed with the educational process. E-learning is considered one of the most important solutions available as an inclusive solution to change traditional educational methods and push them towards the educational remote platforms to ensure the continuity of the educational process. Despite there is strong push towards e-learning assuming that it does not harm the educational process, e-learning for engineering subjects, which require the presence of students and teachers in the Design Studios, is still a highly debatable topic among researchers, due to the necessity of visual communication between them, as well as because of the crucial need to have tools and equipment for work. An example of this is what was said (Salama & Wilkinson, 2007) that e-learning for design studios will not be able to substitute for traditional face-to-face education. Therefore, the issue of the study is in the importance of evaluating the e-learning method for subjects that need design studios in the Department of Interior Design, Faculty of Architecture and Design, Al-Ahliyya Amman University, in addition to the importance of knowing the impacts of e-learning on the efficiency of students' outcomes.

Study Hypotheses

There is no significant difference in the average grades in the subject of spatial planning and visualization between traditional education and education during the COVID-19 pandemic.

Objectives of the Research

The objectives of this research are to assess and compare the academic performance of students in the subject of spatial planning and visualization between traditional education and education during the COVID-19 pandemic. It aims to evaluate the effectiveness of instructional methods used in both settings and identify the challenges and limitations experienced by students and instructors. The research seeks to provide recommendations for enhancing educational practices and instructional strategies in spatial planning and visualization based on the findings of the comparative analysis. Furthermore, it aims to contribute to the existing body of knowledge by shedding light on the effects of educational disruptions, such as the COVID-19 pandemic, on academic outcomes in this subject area.

Questions of the Study

• Main Question of the Study

Is there an impact of the teaching method (traditional before the pandemic/electronic during the pandemic) on the efficiency of the design concept outcomes and the average grades among interior design students?

• Sub-Questions of the Study

- What is the level of learning outcomes in the design concept exercise and the average grades in the subject of spatial planning and visualization via the application of traditional education before the pandemic?

- What is the level of learning outcomes in the design concept exercise and the average grades in the subject of spatial planning and visualization via the application of e-learning during the pandemic?

Study Delimitations

- Thematic Delimitations: Differences between e-learning and traditional education, the subject of spatial planning and visualization. "Introduction to the interior design process, which includes the definition of the complete and various stages of the interior design process and the associated planning of interior spaces. This is through the preparation of the design program that includes the analysis of the external site, analysis of internal spaces, and the analysis of spatial and functional relationships. In addition, it includes the identification and solution of design

problems, identification of users, and environmental, human, and cultural factors that affect the planning of the space to create aesthetic and functional interior spaces. This is also in addition to an introduction to the methods of manual visualization of the various design schemes of the project."

- Time Delimitations: The second term of the academic years (2018-2019) and (2019-2020).

- Human Delimitations: Students of the Department of Interior Design.

- Location Delimitations: Faculty of Architecture and Design, Al-Ahliyya Amman University.

Theoretical Framework

Terms and Definitions of the Study

E-learning: E-learning or virtual education is the type of education that depends on the application of electronic media in communication between teachers and students, and between students and the educational institution as a whole. (ALougily, 2009)

Impact: Ibn Faris quoted from Al-Khalil: "Impact is the rest of what is seen from anything or what is not seen after a tiny clot remains in it". Plural: Impacts (Firouzabadi, 1995, p. 33). Definition from (Salibah, 1982, p. 37) "The result that is resulting from things and that it is the sign, which is the characteristic that indicates the thing, and that it is the thing that is already achieved because it is the effect of something else. It is, in a sense, the synonym of the predicate or the result of things.

Efficiency: The quality of doing something well with no waste of time or money (Oxford Learners Dictionaries, 2022).

Rubric: A rubric is a grading guideline to follow in assessment (Jackson & Larkin, 2002)

Interior Design: Despite its close association with architecture, interior design is relatively modern. It represents the art of treating the architectural space in its various dimensions by making use of design elements, taking into account both aesthetic and functional considerations. Interior design also reflects the broad awareness

of architectural elements and their internal details in particular. (Jackson & Larkin, 2002) It is also defined as the outcome of the processes carried out by the designer and utilizing which he affects his environment through formation, formulation, and how to manifest the internal space in a way that meets the needs of the users and is in harmony with their requirements. (Abdussalam & Al-Emam, 2009)

Novel Coronavirus (COVID-19) Pandemic: A pandemic is a term that is widely used to describe any problem that has spiraled out of control and is defined as an outbreak of a disease over a wide geographical area and affects an exceptionally high proportion of the population. The 2019 coronavirus pandemic is the latest global pandemic. (Z. Ping, 2020)

Learning outcomes: Learning outcomes are direct statements that describe the competencies that students should possess (Deller, Brumwell, & MacFarlane, 2015)

Design Concept: It is a clearly defined and personal vision that can be developed. It is directly tangled with work itself to produce a human activity. There is no human existence for it before the person faces a problem that calls on his curiosity and intervention to solve it, evaluate it, or reach a truth that makes him recall all of his previous experiences and create a new relationship between them to get to the core of the problem. (Ali, 2019)

Teacher Presence: the fact that the teacher is in a particular place (Oxford Learners Dictionaries, 2022), such as design studios for the context of this research.

Previous Studies

The COVID-19 pandemic has posed significant challenges for interior design educators, requiring them to adapt their teaching methodologies to remote and online formats. Several research papers have examined the impact of the pandemic on interior design education and explored the strategies employed by educators to ensure effective teaching and learning experiences.

The paper titled "Exploring Andragogic Strategies in an Interior Architecture Studio" by (Abdel-Hadi, Eissa, &

and El Zeini, 2020) delves into the implementation of adult learning principles within an interior architecture studio. Through a qualitative approach, this study investigates the effectiveness of andragogic strategies by examining various aspects including the learning environment, student-centered approaches, integration of real-world projects, and the role of instructors as facilitators. The findings underscore the importance of establishing a supportive and collaborative learning environment that nurtures self-directed learning, critical thinking, and the development of practical skills. The research significantly contributes to the advancement of teaching practices in interior architecture studios, emphasizing the value of engaging and effective instructional methods to foster successful learning outcomes for students.

In another study, (Thaheem, Abidin, M. J., & Pathan, 2022) investigated the challenges and benefits encountered by tertiary-level teachers in Pakistan and Indonesia during the transition from physical classes to online classes amid the COVID-19 pandemic. Employing a mixed-method approach, the researchers collected quantitative data from 66 teachers and employed descriptive statistics and t-tests for analysis. The findings revealed no significant differences in personal and pedagogical challenges between the two countries, but a notable difference was observed in terms of technological challenges. Additionally, a qualitative analysis of interviews with 10 teachers highlighted positive aspects of online teaching. The implications of this research include the development of technology-integrated courses and strategies for effectively managing the balance between physical and online classes. This study contributes valuable insights into the challenges and benefits of online teaching within the specific context of developing countries.

The paper by (Hattingh, Niekerk, Marais, & Geldenhuys, 2020) investigates the experiences of engineering students in an online learning environment that is accessed remotely. In response to the COVID-19 pandemic and the subsequent shift to online education, the study explores the perspectives of engineering students and their encounters with this new mode of learning. By examining the students' experiences, the paper aims to provide insights into the challenges, benefits, and over-

all effectiveness of remote online learning for engineering students. The research delves into the various aspects of the online learning environment, such as the delivery of course content, interaction with instructors and peers, and the overall learning experience. The findings of this study contribute to the ongoing discourse on remote online education and inform educational institutions and policy-makers about the implications and potential improvements in delivering engineering education remotely.

A study by (Ahmad, Sosa, & Musfy, 2020) focused on the educational approach adopted by the faculty members of the Interior Design Department at the Faculty of Arts and Creative Industries (CACE) at Zayed University as a response to the national closure of educational institutions in the United Arab Emirates following the global outbreak of the COVID-19 pandemic. The study aimed to explore alternative teaching methods and address the completion of graduation projects, with the primary goal of achieving successful learning outcomes and providing students with suitable educational continuity despite the closure.

The study specifically examined the design studio approach in terms of traditional education, online learning, and virtual reality. As architectural engineering and interior design are disciplines closely tied to the design studio environment, which reflects the workplace environment within higher education, the research investigated the transition of students' design works from physical to digital formats. The students' works were transformed into digital submissions and showcased in a virtual exhibition, specially designed for this purpose. Each student had a designated space in the virtual exhibition to present their works, which were then evaluated by a judging committee and made accessible to parents and visitors. The virtual exhibition allowed visitors to access students' works through individual web pages, enabling direct entry to each student's exhibition as the first point of contact and showcasing all the students' works at the forefront of the exhibition. Visitors had the flexibility to select and explore the exhibits they desired, change the viewing path, and adjust their visitation time. This approach provided students the opportunity to integrate their traditional portfolios into their electronic portfolios, facilitating the consolidation of

all their works on a single page and allowing for longer exhibition durations.

A study (Travis, 2011) found that it is essential that the interior design studio incorporate an extensive exploration of conceptual design for students to develop innovative, dynamic projects that push the boundaries of creativity. This paper reviews the literature on conceptual thinking, provides the results and analysis of a survey sent to 100 interior design programs, and provides a method for students to use in the process of concept development in design projects. This methodology, which includes research of the project's context and program, as well as visual (2- and 3-dimensional) and written means, helps to develop a meaningful concept, which becomes the basis for the design of the project. The complexity and importance of the design concept warrant these in-depth studies so that the project will raise new issues in design and incorporate innovative ideas. Case studies based on each method by interior design students from George Washington University are provided.

A study (Al-Ayash & Hussein, 2020) investigated the challenges and experiences of transitioning from traditional classroom education to remote home education during the COVID-19 crisis in the Hashemite Kingdom of Jordan and the Kingdom of Bahrain. The study aimed to compare the implications and consequences of 100% online teaching when educational institutions were forced to implement remote learning due to the lockdown measures. The research focused on two universities, namely the University of Petra (Faculty of Architecture and Design, Department of Interior Design) and the Arabian Gulf University (AGU) - Bahrain (Faculty of Architectural & Interior Design Engineering). The study employed a descriptive-analytical approach, using the case study method to explore the design studio courses introduced during the second term of the 2019-2020 academic year. These courses included basic design, interior design principles, design studios 1, 2, 4, and graduation projects. The findings shed light on the unique challenges faced by students and educators in adapting to this new mode of instruction and provide valuable insights into the implications of the educational transformation caused by the pandemic.

The paper (Najadah & Saleh, 2022) explores the challenges faced by Interior Design and Art Education (ID&AE) students in Kuwait during the initial months of the COVID-19 pandemic and their adaptation to e-learning. The study aims to identify the factors influencing e-learning for ID&AE students and find ways to mitigate educational losses caused by the pandemic. Through group discussions with 182 students over 10 weeks, the researchers addressed 13 main areas of concern. Initially, students struggled with the transition to e-learning but eventually caught up. The paper suggests conducting a comprehensive research study to further examine the attitudes and perceptions of ID&AE students towards e-learning.

The research by (Kamal Zoubi et al., 2023) examined the perceived performance of interior design students during the COVID-19 pandemic in Jordan, comparing Classroom Learning Versus Online Learning. The results showed that first-year students had higher satisfaction ratings, while third-year students had lower satisfaction. Second-year students had moderate expectations and perceptions of both learning modes. The discrepancy in perceived performance could be attributed to factors like the novelty of online learning, the complexity of third-year coursework, and challenges in conveying concepts online. Addressing these issues is crucial for ensuring equitable education across all year levels. The findings offer valuable insights into student satisfaction with online learning and can guide the development of strategies to support students' learning experiences during the pandemic.

Collectively, these research papers highlight the challenges faced by interior design educators during the global COVID-19 pandemic and provide valuable insights into the strategies employed to ensure effective teaching and learning experiences. The integration of virtual design software, online collaboration tools, blended learning approaches, and digital technologies has emerged as key solutions to overcome the limitations of remote teaching. Further research and experimentation in interior design education are necessary to explore innovative approaches that maintain the experiential nature of the discipline and meet the unique needs of students during unprecedented times.

Design Concept

The design concept is the first seed based on which the designer transfers his experiences and creative philosophy from his conscience and feelings into paper. It is to achieve a unique creative image that results from the integration of the designer with his work and the application of design and philosophical theories to creative artistic production. Therefore, the designer shall have a background and details about what will he introduce in this design artwork. (Mahmoud, 2015, p. 418)

The study tackled the delimitations of design concepts based on the academic, aesthetic, and philosophical aspects as follows:

1. Academic Delimitations

a. Social and Environmental Delimitation: This delimitation depends on the user identity by determining the how-to and quality aspects in the design of architectural spaces. For example, users can be from a conservative environment, and on the other hand, there are users from an open-to-life environment. (Garges, 2008, p. 6)

b. Economic Delimitation: There are many users with limited financial capabilities, and vice versa. Therefore, the designer shall innovate and be creative in how to use materials that suit all societal categories without a significant negative impact on the designer's innovative design.

c. Intellectual Delimitation: This is the intervention by the user himself, as it may impose on designers a lot of items and designs that restrict them and limit their creativity and the effectiveness of their concept's application.

d. Actuality Delimitation: This is represented in the functional and aesthetic needs of users.

2. Aesthetic Values

Beauty is all that is related to contentment and gentleness. It is all of what gives our souls pleasure, comfort, a sense of order, and harmony with all that surrounds us with love; this is beauty. Aristotle, Plato, and many philosophers had discussed beauty. Additionally, beauty results from the outcomes of the insight, knowledge, reading, research, creativity, innovation, experience, and taste of the designer. (Gassas, 2016, p. 678)

Designers work on mental visualization regarding

how to create an aesthetic design image that includes harmony and consistency in functional, aesthetic, and deep symbolic aspects. As mentioned previously, based on scientific/academic foundations framed by the sensory framework that was formed from intellectual and chromatic theories, whether contradictory or homogeneous, beauty is appreciated by users and judged positively or negatively. However, in my point of view, if the designer combines his design concept with the user's personality, appreciation and judgment will always be positive.

Many factors affect the users' judgment of beauty, such as mood, feelings, and physiological state at the moment when the design is received. There are also other important factors such as the atmosphere surrounding the user, how to find solutions by the designer, and how he controls these variables and treats the lighting, in addition to the quality of the place assigned for the design. As for places, there are residential, commercial, sports, tourism, treatment, administrative, and environmental places. In each case, the designer has to show and visualize the beauty of his design concept and the user's acceptance of it.

About the concepts of beauty, there is the organization of elements, units, design elements, additions, and accessories in interior design, as these enrich the aesthetic aspects of design and express the design concept vividly and effectively.

These design and intellectual processes are related to evoking a mental image that was formed due to the cumulative academia, specialized knowledge, and the practical organization of that knowledge continually to benefit creativity and its connection with aesthetic values. This is also to achieve a utility value for forms and appearances, in addition to the functional performance (Karim, 2015, p. 175).

Study's Method and Procedures

The selection of the research approach depends on the study's nature and its needs. Therefore, this research will depend on the quantitative approach to the study of e-learning and its impacts on the efficiency of interior design education.

- **Study Approach:** The study adopted the case study approach based on the nature of the study. This is also based on the evaluation and analysis of the outcomes of the interior design students from the Faculty of Architecture and Design of Al-Ahliyya Amman University for one of the exercises in the subject of spatial planning and visualization. This subject was given during the second term of the two academic years (2018-2019) and (2019-2020). This was to measure and compare the efficiency of their learning outcomes.

- **Study Community:** The study population/community consisted of students from the Department of Interior Design, the Faculty of Architecture and Design, Al-Ahliyya Amman University. Number of students was approximately (222) male and female students for the years 2018-2019 and 2019-2020. (Al-Ahliyya Amman University, 2022)

- **Study Sample:** The study sample consisted of students enrolled in the spatial planning and visualization course during the second semester of the academic years 2018-2019 (representing pre-pandemic students) and 2019-2020 (representing e-learning students). The total number of students reached forty, comprising both male and female students. Additionally, their cumulative grade averages varied between 62% and 97%. (Al-Ayash & Hussein, 2020)

- **Tool of the Study:** After reviewing the theoretical literature and examining previous studies related to the current research topic, it was concluded that the most suitable measurement tool for the nature of this study is a rubric instrument in the experimental and controlled groups, as well as the independent variables. The study's instrument consisted of controlled variables, which included the course instructor, exercises, and learning outcomes. The concept analysis approach was employed by applying the following requirements in Table (1).

Table (1) Requirements of (Design Concept Analysis).

Designing the concept has two types:	
1	After doing the programming phase, where the student has to adapt a concept before:
A	Concept Style
B	Concept Idea
After determining the Concept Style and Idea, the student has to select a style to design a guest room, by using Design Concept Analysis:	
2	C Design Concept Analysis
1	Style Name & description
2	Story
3	5's WS + H Questions
4	Verbal words and visual pictures
5	Color scheme (brand name/color number)
6	Concept mood

Table (2) and Table (3) where the learning outcomes of the exercise were evaluated by designing a measurement and evaluation model (Rubric).

Table (2) Learning Outcomes of the Exercise

1. Learning Outcomes of the Exercise:		
Learning objectives / Learning outcomes of the program	PLO #	Learning outcomes for students' capabilities
Interior Design: Design Concept, development of design, and visualization	DP1	Research Skills Skills in analysis, design, and formation
Interior Design: Design Concept, development of design, and visualization	DP4	Skills in communication, evaluation, and visualization

Table (3) Expected results from the exercise study

2. Expected results from the exercise study:			
PLO's	CLO's		
DP1		I1.1.1	Familiarity with the various techniques of design research and solving design problems
DP1	Knowledge	I1.1.5	Familiarity with the mutual effect between advanced design solutions, and the overlapping between furniture distribution and building and construction codes.
DP4		II.2.6	Familiarity with chromatic and color principles, theory, and systems for their use in interior design
DP3		I1.1.4	The ability to evaluate, select, and apply information and research outputs to design
DP3		I1.2.5	Ability to use previous experiences (precedents) to help find design solutions
	Capabilities		
DP4		I1.3.3	Ability to analyze, discuss, define, and organize spaces
DP4		I1.3.10	The ability to apply concepts of human factors in interior design

Where the learning outcomes of the exercise were evaluated by designing a measurement and evaluation model (Rubric) as shown in Table (4).

Table (4) Measurement and evaluation Rubric model

#	criteria	CLOs	Exceptional 91-100% 1.82-2	Strong 80-90% 1.6-1.8	Standard 68-79% 1.36- 1.58	Runnable 55-67% 1,1/ -1.34	need improve- ment 30-54% 0.6-1.08 %
1	Design Concept	11.15	Appropriate information was studied and introduced regarding the design concept. It was also analyzed excellently and applied in the project in a professional manner	Appropriate information was studied and introduced regarding the design concept. It was also analyzed and applied in the project in a very good manner	Information on the design concept was studied, analyzed, and applied in the project in a good manner	Information on the design concept was studied, analyzed, and applied in the project in a fair manner	Information on the design concept was studied and applied in the project in an incomplete manner
2	Color scheme	12.6	Appropriate information was studied and introduced regarding the color scheme. It was also analyzed excellently and applied in the project in a professional manner	Appropriate information was studied and introduced regarding the color scheme. It was also analyzed and applied in the project in a very good manner	The color scheme was studied, analyzed, and applied in the project in a good manner	The proposed color scheme was studied and applied in the project in a fair manner	The proposed color scheme was studied and applied in the project in an incomplete manner
3	Design implementation	11.15 13.10	The interior design of the site was re-designed with the distribution of furniture and the coloring of the scheme in a highly functional and aesthetic manner, which is in line with the highest standards. The concept was applied.	The interior design of the site was re-designed with the distribution of furniture and the coloring of the scheme in a very good functional and aesthetic manner, which is in line with adequate standards. The concept was applied.	The interior design of the site was re-designed with the distribution of furniture and the coloring of the scheme in a good functional and aesthetic manner, which is in line with the correct standards. The concept was applied.	The interior design of the site was re-designed with the distribution of furniture and the coloring of the scheme in a fair functional and aesthetic manner, which is in line with some standards. The concept was applied.	The interior design of the site was re-designed with the distribution of furniture, but the coloring of the scheme was incomplete.
4	Oral presentation: 1. Organization of Presentation 2. Content	11.33	The presentation reflects professionalism in presenting and organizing the content and communication skills with the audience in terms of the method of persuasion in presenting the content	The presentation was delivered in a very good manner, as it reflected the content organization and some communication skills with the audience	The presentation was delivered in a good manner, as it reflected the organization of content and some communication skills with the audience	The presentation was delivered fairly. It also reflected some organization in content and some communication skills with the audience.	Weakness was evident in delivering the presentation, which reflected a lack of content organization and the skills necessary to communicate with the audience.

weak 0-29% 0-0.58	in grades	percent- age of question	examin- er 1	total
The design concept was not introduced	2	40 %	2	20
The color scheme was not introduced	1	20 %	1	10
The interior design of the site was not re-de- signed, nor was the distribution of furni- ture, nor the coloring of the scheme.	1	20 %	1	10
The presentation was not delivered.	1	20 %	1	10

Validity of the Tool: The (virtual/face validity) was verified through:

- Designing a measurement and evaluation rubric in a way that ensures consistent responses to the same question.

- Presenting the exercise images achieved by students to a group of expert reviewers to verify the reliability of the study tool.

• Research Approach

Based on the study's nature and its needs, the quantitative research approach was adopted to study e-learning and its impacts on the efficiency of interior design education.

Fig (1) Work of the student with the highest rating - The second term of the academic year (2018-2019) in traditional education



Fig (2) Work of the student with the medium rating - The second term of the academic year (2018-2019) in traditional education



Fig (3) Work of the student with the least rating - The second term of the academic year (2018-2019) in traditional education



As shown in Fig 1 the work of the student with the highest rating in the second term of the academic year (2018-2019) in traditional education, and Fig 2 is the work of the student with the medium rating – in the second term of the academic year (2018-2019) in traditional education, and can show in Fig 3 work of the student with the least rating – at the same term of the academic year (2018-2019) in traditional education.

Based on the above, it is noted that the highest mark/rating from the student's work, as shown in Fig 1, adhered to the standards discussed earlier and measured by the Rubric evaluation model. This work included a lot of creativity, innovation, and harmony, as well as the integration between style, design concept, method of visualization, and expression of information. As shown in Fig 1 the work of the student with the highest rating in the second term of the academic year (2018-2019) in traditional education, and Fig 2 is the work of the student with the medium rating – in the second term of the academic year (2018-2019) in traditional education, and can show in Fig 3 work of the student with the least rating – at the same term of the academic year (2018-2019) in traditional education.

Based on the above, it is noted that the highest mark/rating from the student's work, as shown in Fig 1, adhered to the standards discussed earlier and measured by the Rubric evaluation model. This work included a lot of creativity, innovation, and harmony, as well as the integration between style, design concept, method of visualization, and expression of information. Moreover, it is noticed in Fig 2 the medium rating where the student adhered to the requirements, but the design was average due to her non-compliance with the standards of interior design upon drawing. As for the lowest rating as shown in Fig 3, the student introduced a new concept, but it was not employed in the horizontal scheme according to the interior design standards. There is no innovation in it as furniture was applied as is and the shapes were assembled with little creativity.

Fig (4) Work of the student with the highest rating - Second term of the academic year (2019-2020) in e-learning



Fig (5) Work of the student with the medium rating - Second term of the academic year (2019-2020) in e-learning



Fig (6) Work of the student with the least rating - Second term of the academic year (2019-2020) in e-learning



In Fig 4 the student worked with the highest rating in the second term of the academic year (2019-2020) in e-learning, and Fig 5 shows the work of the student with the medium rating in the second term of the academic year (2019-2020) in e-learning, finally, Fig 6 is a work of the student with the least rating - Second term of the academic year (2019-2020) in e-learning.

In the figures of works introduced by the students in the second term of the academic year (2019/2020), it is noted that the highest rating in the exercise shown in Figure 4, via e-learning, that the student complied with all the requirements of the exercise, was creative, innovated in the visualization technique, and used smartphone apps, which led to the clarification of her concept and style of design. It is worth noting that students in the period of the Covid-19 pandemic were quarantined in homes. Therefore, none of them was able to bring any of the colored markers, watercolors, drawing cardboard, etc.

Fig 5, shows the average level in the division, where the student did not try to uplift his work. He adhered to the requirements only without creativity and innovation in the work. In addition, it is noted in Figure 6 that the student worked at the lowest level in the division. This was at the core of the architectural drawings. Moreover, there is a weakness in elaborating the design concept design pattern and visualization.

Statistical Analysis

The purpose of this analysis was to compare the performance between Face-to-Face (Traditional) Education and Remote (Electronic) Learning. The data consisted of ratings on a scale of 1 to 5, with 1 representing the lowest performance and 5 representing the highest performance. The data were analyzed using SPSS V22.

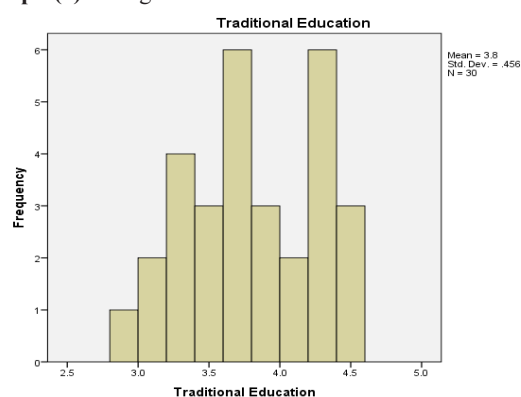
Table 5 provides an overview of the central tendency, variability, skewness, and kurtosis for the two groups, Traditional Education and Remote (electronic) Learning. The mean rating for Traditional Education is 3.8, indicating that, on average, the ratings were close to 3.8. The median rating is also 3.8, suggesting that half of the ratings in this group were at or below this value. The standard deviation of 0.46 indicates relatively low variability in the ratings

for Traditional Education. In contrast, for Remote Learning, the mean rating is 3.5, with a median of 3.7, indicating slightly lower ratings compared to Traditional Education. The standard deviation of 1.1 suggests higher variability in the ratings for Remote Learning. Both groups exhibit slight left-skewness, with skewness values of -0.17 for Traditional Education and -0.86 for Remote Learning. The kurtosis value of -0.85 for Traditional Education suggests a platykurtic distribution with lighter tails, while the kurtosis value of 0.01 for Remote Learning indicates a distribution close to normal.

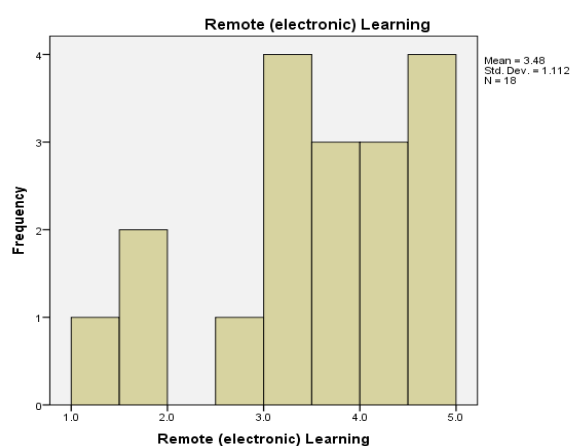
Table (5) Summary statistics

	#	Mean	Median	Std. Deviation	Skewness	Kurtosis
Traditional Education	30	3.8	3.8	0.46	-0.17	-0.85
Remote (electronic) Learning	17	3.5	3.7	1.1	-0.86	0.01

Graph (1) Histogram for Traditional Education student's grads



Graph(2) Histogram for Remote (electronic) Learning student's grads



Histogram showing on graph 1 in the Traditional Education group, the ratings range from 2.75 to 4.25, with the most frequent ratings appearing between 3.0 and 3.75. The histogram for Traditional Education would show the concentration of ratings within this range. In the Remote (electronic) Learning group graph 2, the ratings range from 1.0 to 5.0, with the most frequent ratings appearing between 3.0 and 4.0. The histogram for Remote (electronic) Learning would display the distribution of ratings within this range.

To determine if there was a significant difference in performance between the two groups, a two-sample t-test was conducted. The analysis revealed a statistically significant difference in performance ($t = -3.16$, $p < 0.05$), indicating that Traditional Education had a higher average rating compared to Remote Learning.

It is important to note that the effect size and confidence intervals were also considered. Although the difference in mean ratings was statistically significant, the practical significance may vary. The effect size indicated a small-to-medium effect (Cohen's $d = -0.96$), suggesting a moderate difference in performance between the two groups.

Conclusions

1. In conclusion, the statistical analysis revealed a significant difference in performance between Face-to-Face and Remote Learning, with Remote Learning showing a lower average rating. These findings contribute to the understanding of educational methods during the COVID-19 pandemic and emphasize the potential benefits of Face-to-Face learning in certain contexts.

2. The study proved that students during traditional education before the pandemic were more interactive and integrated in providing the design concept exercise and in the mid-term exams. On the other hand, students were less enthusiastic and engaged during e-learning in the subject of spatial planning and visualization.

Discussion of Conclusions

The results of this study, which resemble weak students' learning outcomes during the e-learning period in the pandemic, based on the comparisons of the attached statistical analysis and the evaluation and measurement model (Rubric), are attributed to the absence of visual

communication between teachers and students.

This in turn has led to a lack of academic communication for discussion and exchange of views. Additionally, there were the effects of the overall lockdown in the country, which prevented students from communicating and obtaining basic supplies to carry out their assignments.

Recommendations

To address the challenges and improve the effectiveness of remote learning in practical courses, several recommendations can be considered. Firstly, the addition of a practical course that focuses on developing creative problem-solving skills in situations where necessary resources may not be available. This can help students adapt and find innovative solutions. Secondly, maintaining remote communication between teachers and students even during face-to-face (traditional) education is a precautionary measure, that can facilitate seamless transitions to remote learning if needed. Thirdly, providing faculty members with the necessary equipment and tools in ideal circumstances, accompanied by proper training in their usage. This ensures instructors are equipped to deliver effective remote instruction. Fourthly, conducting further research to enhance e-learning outcomes, striving to surpass the quality of traditional education in practical courses.

This can lead to continuous improvement and innovation in remote learning approaches. Lastly, the creation of educational platforms and virtual labs that can be utilized when needed, offering students practical experiences and hands-on learning opportunities in virtual environments. Implementing these recommendations can contribute to the advancement and effectiveness of remote learning in practical courses. Also, limitations of this statistical analysis include the relatively small sample size and the specific context in which the study was conducted. Additionally, other factors such as individual learning styles and technological resources may have influenced the results.

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conflict of interest

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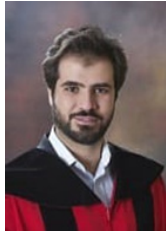
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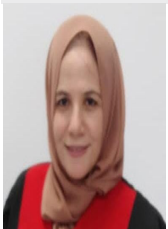
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