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DETERMINING THE SUCCESS FACTORS OF DISTANCE EDUCATION SYSTEMS IN ARCHITECTURAL EDUCATION

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Architectural education is unique among the disciplines that provide studio-based education beside theoretical education. By the nature of education, architecture students spend most of their times at design studios. Design studios play vital role in architectural education, since they are not only physical spaces but also active learning environments. This characteristic of education requires face-to-face education and interaction. Due to the COVID-19 pandemic there was a forced transition at architectural education from face-to-face to distance education system in universities. This transition has brought both useful opportunities such as timelessness and locationlessness, as well as problems such as lack of communication and lack of cooperation among peers. The main disadvantage of distance education in architecture is dramatically reduction of the interaction between the instructor and the student. With the forthcoming waves of COVID-19 and any other force majeure, distance education systems may be compulsory. To increase the efficiency, determining the success factors of distance education system in architectural education is important. Therefore, the aim of this study is to explore the critical success factors of distance education systems in architecture education. To reach this aim a questionnaire was composed by researchers with systematic literature review and conducted to students who are studying at architecture schools in Turkey. Within the scope of this research, 232 architecture students were surveyed, and the results were analyzed statistically with the Relative Important Index. As a result, the most crucial factors affecting the success of the distance education system in architectural education were determined.

Keywords: Online learning, Distance learning, Architecture education, COVID-19.

1 INTRODUCTION

The COVID-19 pandemic, which has not experienced a similar situation in the recent or distant past (Metinal and Gümüşburun Ayalp 2022) has shown its effects in many areas all around the world. Psychological, sociological, and economic effects of the pandemic have been observed in a wide variety of fields from transportation to manufacturing, tourism to the economy (Varma and Jafri 2021). Education is one of the most affected areas (Ceylan *et al*. 2021), which has been negatively impacted by the COVID-19 pandemic.

The COVID-19 pandemic has forced authorities to take crucial precautions to keep their communities safe (Megahed and Hassan 2022). The beginning of the measures is the suspension of face-to-face education all around the world (Tandon *et al*. 2022).

As part of the measures, all education stakeholders have been impacted by the disruption of education. Besides, the sustainability of education has been damaged as different levels of

education were suspended after face-to-face teaching became impossible to continue. In this case, as a permanent and balanced approach, it has led to the emergence of distance education, which is a partially "new" education system, by adapting to the current pandemic conditions. This transition has brought both new opportunities, such as flexibility (Megahed and Hassan 2022) and access to recorded lectures (Ceylan *et al*. 2021), as well as new challenges, like a lack of interaction and communication (Varma and Jafri 2021). Also, this new educational method was unable to completely eliminate the problems caused by the COVID-19 pandemic, particularly in practice-based disciplines with specific needs such as architectural education (AE) (Varma and Jafri 2021, Asadpour 2021, Tandon *et al*. 2022).

AE is not just a regular education that is achieved through training (Ceylan *et al*. 2021). It has certain requirements that, by their nature, cannot be met in distance education, like learning by doing (Schön 1987), ensuring the intense interaction and effective communication between students and instructors (Schön 1987, Ceylan *et al*. 2021), peer learning (Megahed and Hassan 2022) etc.

Although, these demands, which can be easily met in face-to-face education, become quite difficult in distance education (Asadpour 2021, Megahed and Hassan 2022). To be more specific, in distance AE, students cannot communicate with each other easily (Tandon *et al*. 2022), healthy interaction is not offered (Varma and Jafri 2021), and peer learning is not provided (Megahed and Hassan 2022).

In this context, the inability to meet the unique requirements of AE has called into question the success of distance education in AE. In this respect, determining the success factors of distance education systems in architectural education will be able to offer solutions to these deficiencies and also contribute to the sustainability of AE in times of possible crises in the future. Therefore, the current study's aim is to identify the critical success factors of distance education systems in AE.

2 METHODOLOGY

This study is limited to the scale of Turkey and its target population is architecture students in Turkey. The framework consists of two successive stages: first, the creation of the 5-point Likert scale questionnaire with a systematic literature review (SLR), and then the calculation of the relative importance rankings (IRI) of the criteria based on the respondents' answers.

2.1 Systematic Literature Review (SLR)

SLR is a research method that is used to locate and critically evaluate relevant research, as well as gather and analyses data from that study (Liberati *et al*. 2009). A SLR on the effects of COVID-19 on AE was conducted in this study, and potential criteria influencing the success of distance education in AE were collected.

The protocol used to search the Web of Science (WoS) database, which contains nearly all major research articles (Yu *et al*. 2022) are as follows: (ALL FIELDS) "online education" OR "distance education" OR "online learning" OR "distance learning" OR "e-learning" AND "architecture education" AND "COVID-19". The timeframes considered were 2020 and 2022. The search yielded 558 publications. In the next step, well-defined inclusion and exclusion criteria were applied. In this scope, all the obtained documents were reviewed and 527 documents were removed (Kitchenham and Charters 2007). A total of 31 articles were chosen for development of questionnaire.

2.1.1 *Organizing questionnaire and data collection*

The studies selected for the formation of the questionnaire items were examined under seven main headings, and a total of 53 criteria were obtained. Afterward, the questionnaire created with these criteria was administered to 232 architecture students who are studying in Turkey.

2.2 Index of Relative Importance (IRI)

IRI analysis was used in this study because to determine the relative ranking of the criteria and it's transformed from all the numerical scores of the identified criteria. These ranking enabled the researchers to cross-compare the relative importance of the criteria as perceived by respondents (Rooshdi *et al*. 2018).

The IRI is carried out as follows (Zhao and Chen 2018):

$$IRI_k\ (\%) = \frac{5(n_5) + 4(n_4) + 3(n_3) + 2(n_2) + n_1}{5(n_5 + n_4 + n_3 + n_2 + n_1)} \times 100 \quad (1)$$

IRI_k (%) in Eq. (1) represents the COVID-19 effects on AE and is evaluated individually for regarding data (k) of respondents. In the equation, "k" specifies the impact level of the criteria.

The overall IRI for each impact was calculated for all sets of effect levels using the weighted average of the IRI_k in the following stage (El-Gohary and Aziz 2014):

$$Overall\ IRI_k\ (\%) = \frac{\sum_{k=1}^{k=5} (k \times IRI_k)}{\sum_{k=1}^{k=5} k} \times 100 \quad (2)$$

The *Overall IRI* (%) in Eq. (2) represents the total weighted average percentage of the IRI for each criterion.

3 FINDINGS

3.1 Reliability Analysis

Reliability of the questionnaire was measured by Cronbach's Alpha (α) coefficient. The α value of 53 criteria was determined as 0.985, that is above the minimum threshold of 0.700 (Tavakol and Dennick 2011). According to this value internal consistency of the questionnaire is excellent.

3.2 Index of Relative Importance Analysis

The relative importance of criteria, according to the answers given by the participants to the 53 criteria asked on a 5-point Likert scale, is shown in Table 1.

Table 1. Results of relative importance index analysis.

Classification	Code of Criteria	Criteria	Overall IRI	Rank of Criteria
Technical and technological infrastructure	T1	Lack of an adequate technical background to solve networking and software related issues	55,81	35
	T2	Technical issues	58,22	17
	T3	Lack of fast and stable internet connection	61,05	7
	T4	Low-screen resolution quality - The screen resolution makes it difficult to see the design work in detail	57,31	27
	T5	The emergence of cyber security risks	47,89	53
	T6	Insufficient screen resolution to accurately display and critique scaled drawings	53,45	47

Table 1 (*contd*). Results of relative importance index analysis.

Classification	Code of Criteria	Criteria	Overall IRI	Rank of Criteria
Technical and technological infrastructure	T7	Lack of the possibility of drawing or sketching on the screen; difficulties with using the mouse for sketching	58,06	21
	T8	Issues with the availability of up-to-date and appropriate hardware and software platforms	54,91	40
	T9	The need for user-friendly interfaces and applications to make e-learning easy	59,14	13
Health and psychology	HP1	Lack of guidance and support	57,80	24
	HP2	Lack of privacy (felt by both teachers and students)	49,52	52
	HP3	Time and workload management (i.e., an increase in the number of tasks	54,17	44
	HP4	Increased sense of isolation, and disconnection from peers and colleagues	56,19	32
	HP5	Psychological problems/negative feelings that could lead to alienation, uncertainty, confusion, and identity loss	54,79	41
	HP6	The dissolved boundaries between the work environment and home environment (i.e., struggle with establishing boundaries between work and family)	55,28	37
	HP7	When feedback is delayed, students feel stress, frustration, and confusion	60,66	9
	HP8	The lack of emotional connection	56,26	31
	HP9	Insufficiency of self-discipline and concentration issues	55,87	34
	HP10	Extended working hours for instructors	56,65	30
	HP11	Instructors are struggling to keep students concentrated throughout the lesson	55,94	33
	HP12	Instructors are struggling to motivate students to ask question	54,24	43
Pedagogy	P1	Due to the inability to create campus-culture and university spirit online, students are deprived of this opportunity	60,80	8
	P2	Without facial expressions and body language, designs and presentations become rather dull for participants	57,04	29
	P3	Expectation from students to be more responsible for their own education	62,59	5
	P4	Lack of skills to utilize devices or facilities (the need for more time and practice to use new software and applications)	66,42	3
	P5	Instructors' inability to integrate technology or insufficient software skills (which influences the efficiency of the course)	68,18	2
Interaction, communication and satisfaction	ICS1	Students are struggling to understand online lectures, design juries, and critiques	57,50	26
	ICS2	Lack of peer learning	57,95	22
	ICS3	Students are uncomfortable because they cannot view their classmates' progress and projects	54,58	42
	ICS4	Lack of interaction, communication, and cooperation among students	59,84	11
	ICS5	Low interaction and communication issues among students and between and students and instructors	58,17	18
	ICS6	The difficulties in understanding teachers' instructions online	58,16	19
Educational adaptation	EA1	Working with 3D models and animations without hand sketches or physical models makes expressing design ideas difficult	53,85	45
	EA2	Inadequacy of critique frequency and quantity	59,02	15
	EA3	Student assessment issues	60,29	10
	EA4	Lack of immediate access to teachers' help	61,40	6
	EA5	Concerns about cheating	55,57	36
	EA6	Increased time spent on lectures and design critiques	63,09	4

Table 1 (*contd*). Results of relative importance index analysis.

Classification	Code of Criteria	Criteria	Overall IRI	Rank of Criteria
Educational adaptation	EA7	Students are dissatisfied with the new assessment criteria adapted to distance education	51,77	49
	EA8	Adequate and reliable assessment tools are needed due to unsupervised exams, projects, and assignments	59,79	12
	EA9	It causes stereotypical designs that are far from aesthetic	53,46	46
	EA10	There will be a biased evaluation as the students' names are visible to the evaluators on screen while evaluating	51,41	50
	EA11	The focus on learning the technology rather than on the information taught	50,55	51
	EA12	Unfamiliarity with quiz/exam formats	53,19	48
	EA13	Instructors are not able to know whether the lesson topics and contents are understood by the students	58,11	20
	EA14	Instructors cannot agree among themselves on student work or reconciling grades	55,28	38
	EA15	Instructors are having difficulty preparing, publishing, and administering online exams	55,23	39
	EA16	Having students' cameras turned on during online lecture sessions will greatly benefit their learning experience	57,04	28
	EA17	Working with drawings and 3D models in a digital environment without an adequate hand sketch prevents the designs from reaching the expected maturity level	57,53	25
Economic factors	EF1	Lack of access to resources	59,11	14
	EF2	The absolute need for accessibility to hardware such as tablets and computers	69,91	1
Other factors	OF1	The lack of privacy and a proper work environment (home, dormitory etc.)	57,83	23
	OF2	Interruptions of online lessons due to family members or environmental factors	58,73	16

IRI analysis was implemented to rank the relative importance of each criterion, as showed in Table 1.

When the relative importance ranking conducted according to the answers of the participants is examined, the top 5 criteria for the success of the distance education systems in AE are, respectively:

1. The absolute need for accessibility to hardware such as tablets and computers (**EF2**)
2. Instructors' inability to integrate technology or insufficient software skills (which influences the efficiency of the course) (**P5**)
3. Lack of skills to utilize devices or facilities (the need for more time and practice to use new software and applications) (**P4**)
4. Increased time spent on lectures and design critiques (**EA6**)
5. Expectation from students to be more responsible for their own education (**P3**).

4 CONCLUSIONS

Resulting from the threat of COVID-19 disaster, the architecture departments of universities have fast-shifted to distance education as all academic departments. However, this transition was implemented without any preparation, which brought with it new problems.

In this study, these problems were defined and ranked according to their relative importance. Among these problems, "*the absolute need for accessibility to hardware such as tablets and computers (1), instructors' inability to integrate technology or insufficient software skills (2), lack*

of skills to utilize devices or facilities (3), increased time spent on lectures and design critiques (4), expectation from students to be more responsible for their own education (5)" were determined to be the most important.

After examining the top criteria, it was determined that "the absolute need for accessibility to hardware such as tablets and computers (EF2)" was the most serious issue. In order to solve this problem, administrative authorities such as ministries of education or boards of trustees should increase the accessibility of the hardware used in distance education and provide students with the most up-to-date software.

Although not at the top of the list, the dominance of pedagogical problems is seen. Among the pedagogical issues, it is clear that problems related to teachers' use of technology in education are more prominent. To overcome these challenges associated with instructors' technological competence, universities or other higher education institutions should systematically train their instructors and keep their knowledge and skills up to date.

Those who want to succeed in distance architecture education can do so if they pay attention to these problems and their solutions.

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