

## Investigating Psychological Factors Influencing Perceived Student Satisfaction Toward Online Learning

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### Abstract

In several countries, online learning has been used in place of traditional learning as a re-sult of the Covid-19 pandemic epidemic, and various online learning approaches have been promoted and implemented. The epidemic pushed a shift away from traditional classroom settings to online learning as it spread over the world. Thus, many educational settings in third-world countries have encountered challenges in successfully carrying out e-learning programs including Kurdistan. Nonetheless, assessing students as the main stakeholders in the process of e-learning is worth considering to develop an education system in compliance with their needs. Therefore, the research is aiming to develop a ho-listic model that conceptualizes a thorough picture of the most crucial factors that impact student satisfaction through following diverse-method, and mainly depending on the quantitative data collected from four universities in Erbil. Multiple data analysis methods have been utilized through this research such as Pearson Coefficient Correlation, Multiple Linear Regression, and T-test. The results show that students' satisfaction after the recent experience has been moderate and the factors for electronic course design quality and content are the most influential on students' satisfaction followed by student e-Communication, technology quality, and lastly, student Self-efficacy in terms of using technology. This research will help academicians to understand students' needs through comprehension of which factors enhance students' learning and satisfaction levels.

**Keywords:** E-learning; Student Satisfaction; Online Education; Key Factors

### 1. Introduction

The dramatic development of technology in various aspects has had a marked impact on a changing world, leading societies to the phenomenon of virtual reality. In the meantime, by considering the daily expansion of knowledge, the education sector has paved the way for developing a new approach that makes the interaction between lecturers and students easier by transferring educational content around the world faster using the e-learning system [8][13]. In fact, this new modern method of learning has become a powerful tool that is changing the traditional methods of education, because it reinforces the capacity of learning and teaching at the same time [1]. It also offers active learning and more interactivity, which help to promote idea-sharing among students and lecturers [5]. E-learning can be even more adaptable by providing an alternative to the traditional classroom teaching models and intensifying the learning process through acquiring or supporting the dissemination of knowledge via various technologies, such as video conferencing, audio chatting, and online discussion tools [21]. This beneficial progress within the realm of telecommunications and Internet technologies has effectively removed the constraints of geographical distance, time, and space. Additionally, it has created more free time for teaching and learning activities, which in itself allows for elemental changes within the learning environment [6].

Furthermore, the expansion of online learning opportunities has led to a burgeoning of its programs changing the way lecturers interact with learning around the world [22]. These massive developments in technology reflected in the educational sector have led to an oversized curriculum change all around the world in terms of redesigning and remodeling. Yet the way each different group has responded to this transformation has taken different forms. Meanwhile, blending e-learning into learning and teaching could be challenging, whereby designers may face many obstacles and barriers to integrating e-learning and developing a successful education program [17].

However, in the Iraqi Kurdistan Region, which was in its continuous development stage of ICT, the shock of the transition from traditional education methods on-campus to online platforms left students psychologically unprepared. This happened when the majority of the attention was on the lack of proper technological infrastructure as the obvious hindrance in the region; students' characteristics and their needs, due to a lack of understanding of the population, remained vague; this caused faculty members to face massive challenges in designing the online study programs according to what students needed.

While there have been several studies conducted by scholars in different parts of the world in the area of e-learning that reported the importance of several factors that impact students' learning experience, there are limited studies that holistically defined student satisfaction levels. Hence, this research, through the information obtained from previous studies on students' perceptions concerning the experience of online study throughout the world, combined it with KRI's students' impressions and developed a student survey which is one of the first ones intended to evaluate students' online learning experience through investigating several factors, influences on student satisfaction in Erbil universities during the pandemic. The study's goals, which are based on the problem description, are:

1. To form a conceptual framework that determines the relationship between identified factors and student e-learning adoption.
2. To measure the impact level of each factor that influences perceived students' satisfaction with the online learning systems.
3. To determine the difference between female and male students in relation to the research's identified variables.

## **2. Online Student's characteristics**

Students' mentality, as well as their social and personal characteristics, must be identified before offering the course online, so that lecturers will not solely focus on content development based on learning objectives, but also on the identified characteristics of the targeted demographic [23]. It is worth mentioning, that some students suffer from technology anxiety, or 'technophobia', which means, negative emotions and physical sensations that arise when the affected person deals with the computer [12]. Relevant research in the area of IT has proved that affected people normally experience trouble adopting and actively applying new technologies, instead they prefer using traditional solutions [20]. In addition, students' confidence in applying technology, in which students are independent in learning, by demonstrating more confidence when they are dealing with technology compared to those students who are less confident and depend on other students for learning, strongly influences their performance and satisfaction during their online learning experience [8]. Actually, focusing on factors related to student characteristics improves student performance while learning over the Internet [15]. To better identify students' characteristics and their influence on students' points of view, the sustainability of technology is estimated through information communication technology (ICT) usage and recognized those factors as influencing students' satisfaction and their intention toward using ICT in education. Researchers found that students' computer self-efficacy is one of the major determinants of students' perceived ease of use and usefulness [3]. It is also found that students' computer anxiety showed a positive moderate linear relationship to their perceived e-learning satisfaction [19]. Based on this, the following hypotheses can be considered:

Hypothesis 1: A positive approach to students' technology anxiety will positively impact student satisfaction with e-learning.

Hypothesis 2: Students' technology Self-efficacy will positively impact student satisfaction with e-learning.

## **3. Online Lecturers and Their Course Designs**

In an online learning environment, lecturers should design a learning environment, as effective as a traditional learning environment in a web-based model of teaching [27]. Lecturers also should design the online course to be useful for the subjects and their organization to make it understandable and logical to students. They can offer multiple teaching materials, including hypertext, videos, assigned reading, video recordings, exams, or any other materials through e-tools [14]. There is an extra responsibility for lecturers while teaching over the Internet, because they have to adapt themselves to a new environment and facilitate learning and interaction, among

students and themselves [7]. Therefore, lecturers' quality and facilitation in online classes are one of the hot topics of the day because electronic communication may not be as effective as traditional communication due to the lack of emotions, facial expressions, and body language in online classes. Therefore, lecturers' skills in online teaching methods to design course content, as well as their quality and facilitation, are always important [7].

However, the number of students within a course should be balanced by the provision of good quality of teaching to enhance students' satisfaction and demonstrated that lecturer competency has a positive and significant effect on teaching quality, and student satisfaction is indirectly influenced by the quality of teaching [25]. In a systematically reviewed study, to evaluate the evidence of student satisfaction toward e-learning and identify vital factors that impact e-learning and its usefulness in teaching. The result of their study represents that major factors that influence e-learners' satisfaction is divided into two categories learners, and lecturers (management and curriculum designing,) [8]. In a report that aimed to discover more critical factors in the area of e-learning, certain factors related to lecturers' presence, the content of the course, lecturer interaction, as well as how well-designed offline and online activities, were among several other factors identified to be more dominant and showed a major impact on student satisfaction [18]. Baber carried out another survey to discover determinants of student satisfaction, findings from the research showed that online course structure, instructors' knowledge, and facilitation, positively influenced their perceived learning outcome and satisfaction during the pandemic [7]. Accordingly, the hypotheses for this aspect can be as follows:

Hypothesis 3: lecturers' quality/ facilitation will positively impact on student satisfaction with e-learning.

Hypothesis 4: Course design quality will positively impact on student satisfaction with e-learning.

#### **4. Technological and Communication Quality**

Generally, students' and lecturers' communication in an online learning environment can take place in two forms asynchronous, in which interaction doesn't occur at the same time, and also synchronous using audio channels, video-conferencing, and online chat room tools [16]. Actually, all of the instructional tools offered by an Internet-based learning environment provide the stage for a constructivist method of teaching, where students' ability of analytical and critical thinking will be developed through teamwork, interaction with other students, and the lecturer. Thus, the more interaction among the peers the more their human and collective effort in understanding, considerable learning, as well as discussions [8]. However, online learning may involve discussion and learning using different tools; therefore, every e-learning system should be designed in a way that matches students' comfort with specific software and system by providing them with adequate training and technical support [16]. Many researchers have found that student online communication, and the technological quality with regard to e-learning platforms, Internet speed, and services offered to students, are those critical factors that influence students to be satisfied or dissatisfied with e-learning systems [26] [11]. Chen, 2020 stated that the main factors influencing users' satisfaction with online teaching platforms were system quality, communication quality, service quality, and platform availability which collectively had the greatest impact on student satisfaction compared to students' personal characteristics [10]. Similar to the previous research, in a study specific to students' immediate satisfaction with online courses during the pandemic of Covid-19 in Vietnam students reported that they were having difficulties with the quality of the Internet and facing disruption during online classes, which were considered a major obstacle toward their online learning [11]. Another study in Peshawar, Pakistan, stated that meager Internet facilities, and little understanding of students about learning online, normally develop a negative approach among students to online learning. Technology infrastructure receives more attention in developing countries, whereas in developed countries, other factors, at more advanced levels such as security and quality of delivery are the center of users' attention [2]. Through an interview-based survey, in Malaysia. The result revealed that there were five core factors, including quality of information offered online, task technology fit, quality of the system, utility value, and online programs usefulness were the major factors that influenced both instructors' and students' continuance satisfaction toward e-learning [4]. As a consequence, the following hypotheses can be generated:

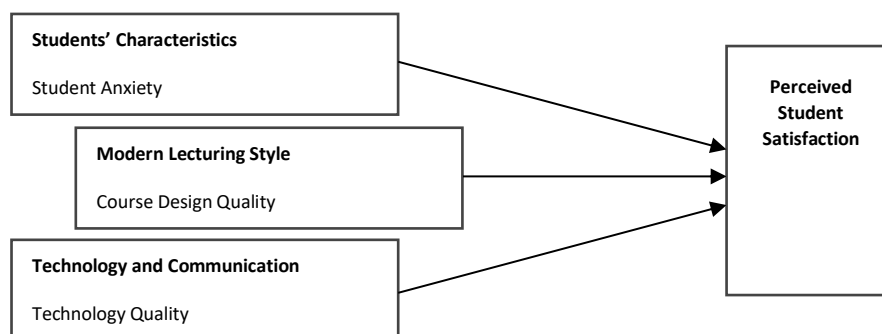
Hypothesis 5: Technology quality will positively impact on student satisfaction with e-learning.

Hypothesis 6: Students' e-Communication will positively impact on student satisfaction with e-learning.

## 5. Materials and Methods

### 5.1 Research Framework

The conceptual framework of this research is devised in a way that reflects the three aspects of student characteristics, lecturers in designing courses or pedagogy, which in this document is named the ‘modern lecturing style’, as well as technology and communication with the items of the factors shown in Figure 1.



**Figure 1: Research Conceptual Framework**

### 5.2 Research measurement and pilot test

Before the data collection process started, through a series of interviews with online learners the design and model of the research are validated; the questionnaire was designed on a 5-Likert scale format (ranging from 1 to 5 as strongly disagree to strongly agree respectively). A pilot test is conducted and a Cronbach’s alpha test is carried out in which all alpha values surpassed 0.7 reliability [24, 28]. The data collection process was conducted in March 2021 using a non-random sampling technique, when the students engaged in an online study necessitated by the second wave of the pandemic. The source of data consisted of four universities in Erbil, both public and private. The responses received from each university were 812 responses in total. During the process of data cleaning, ninety-nine of the duplicated responses were ignored. Therefore, the full sample size for data analysis was 713.

Correlation analysis was used to determine how the explanatory and response variables related to one another. Regression analysis is a statistical approach for modeling the functional connection between a response variable and a group of explanatory or predictor variables [29; 30; 31].

The independent sample t test distinguishes two variables' means [28, 29]. For instance, the independent sample t-test was employed to examine the relationship between independent factors like gender and dependent variables like SA, SSE, LQF, and SEC. SPSS tool was used for the analysis of the data in various ways.

## 6. Results

Participants are almost equally male and female and are mainly between 17 and 24 years old. A significant portion of students, who experienced online learning, to the degree of 49%, considered themselves to have an intermediate level of experience in using a computer. Following that, 30% considered themselves experts, and 20% claimed they were beginners.

**Table 1. Students' Demographic.**

Item	Class	Frequency	Percentages
Gender	Male	349	51.1%
	Female	364	48.9%
Age	17 -20 years	321	45.0%

	21 - 24 years	328	46.0%
	25 - 28 years	30	4.2%
	29 years and more	34	4.8%
Experience of using Computer	Beginner	146	20.5%
	Intermediate	352	49.4%
	Expert	215	30.2%

Table 2 shows, 35% of students did not have regular access to the Internet. One reason could be the remote living areas of some students that the Internet coverage was not up to the required level.

**Table 2. Students Access to the Internet**

Item	Class	Frequency	Percentages
Access to regular Internet connection	Yes	461	64.7%
	No	252	35.3%

Table 3 shows Cronbach's alpha value with the mean and standard deviation of each variable and all the results of the survey constructs have passed their reliability tests.

**Table 3. Data Measurements**

Constructs	Items	Means	SD	Cronbach's Alpha
Student Anxiety(SA)	SA1	3.27	1.26	0.74
	SA2	3.25	1.31	
	SA3	3.30	1.18	
	SA4	3.77	1.14	
Student efficacy(SSE)	Self-SSE1	3.40	1.32	0.81
	SSE2	3.48	1.28	
	SSE3	2.95	1.33	
	SSE4	3.68	1.13	
Lecturer Quality Facilitations (LQF)	LQF1	2.99	1.21	0.83
	LQF2	2.70	1.19	
	LQF3	2.97	1.27	
	LQF4	2.76	1.19	
	LQF5	3.06	1.17	
Course Content and Design (CDQ)	CDQ1	3.06	1.22	0.77
	CDQ2	3.03	1.31	
	CDQ3	2.92	1.23	
	CDQ4	2.62	1.38	

Technology Quality (TQ)	TQ1	2.85	1.35	0.83
	TQ2	3.16	1.21	
	TQ3	2.71	1.25	
	TQ4	2.49	1.34	
	TQ5	3.38	1.25	
	TQ6	2.61	1.30	
Student e-Communication (SEC)	SEC1	2.87	1.45	0.79
	SEC2	2.55	1.32	
	SEC3	2.69	1.31	
	SEC4	2.94	1.33	
Perceived Student Satisfaction (PSS)	PSS1	2.61	1.49	0.93
	PSS2	2.68	1.42	
	PSS3	2.46	1.33	
	PSS4	2.74	1.36	

The results of table 4 show that all the explanatory variables have a positive correlation with the response variable (Perceived student satisfaction), where Course design quality had the strongest significant relationship with response variables, while the other explanatory variables had the weakest significant positive correlation with perceived student satisfaction.

**Table 4. Results for the Pearson Correlation Analysis (n=713)**

	SA	SSE	LQF	CDQ	CDQ	CDQ	PPS
SA	0.693**	0.479**	0.492**	0.539**	0.427**	0.478**	0.478**
SSE		0.510**	0.570**	0.609**	0.509**	0.558**	0.558**
LQF			0.701**	0.668**	0.544**	0.559**	0.559**
CDQ				0.713**	0.652**	0.726**	0.726**
TQ					0.608**	0.682**	0.682**
SEC						0.699**	0.699**

\*\* . Correlation of variables are significant at the  $p < 0.01$  level (2-tailed).

Multiple regression analyses' findings are presented in Table 5. Furthermore, the same table displays the ANOVA table for evaluating the goodness of fit of each explanatory variable on the response variable (perceived student satisfaction). The coefficient of determination ( $R^2$ ) clarifies how much variation in student satisfaction is explained by all explanatory variables and reflects that 93% of the variation of PSS is determined by CDQ, SEC, TSQ, and SSE as explanatory variables, in which the value for R adjusted square is the same and the remaining variation is turned to other factors that affect perceived student satisfaction as the response variable. By this means, among six explanatory variables, the four factors of student Self-efficacy, technology quality and service, students' e-Communication, and course design quality during online courses in this survey are considered to have had a vital impact on perceived student satisfaction, where P-values are less than 0.05.

**Table 5. Result of Stepwise Regression Analysis (n=713)**

	Coefficients		Model Summary			ANOVA	
	$\beta$	t	P-Value	Correlation	R Square	F	P-Value
CDQ	0.429	9.145	0.001				
SEC	0.372	10.416	0.001				
TQ	0.289	6.412	0.001	0.960	0.930	2817.191	0.001
SSE	0.104	2.431	0.015				

The weight of the model shows that there is a reasonable level of representativeness in the identified variables where  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ , and  $\beta_4$ , are recognized weights of four recognized vital factors respectively. Symbolically, the model of prediction can be represented in the formula below:

$$PSS = \beta_1 CDQ + \beta_2 SEC + \beta_3 TQ + \beta_4 SSE \quad (4.1)$$

$$PSS = 0.429(CDQ) + 0.372(SEC) + 0.289(TQ) + 0.104(SSE) \quad (4.2)$$

In the above formula, PSS is the perceived students' satisfaction; CDQ is the course design quality; SEC is the students' e-Communication with each other; TQ is the technical quality and service; SSE is the student's Self-efficacy in terms of utilizing the technology.

As shown in Table 6, there is a statistically significant difference (where the P-value is less than 0.05) between means of female and male students for explanatory variables, including SA, SSE, LQF, and SEC, where female students show more anxiety and less self-efficacy compared to male students. Female students also show less satisfaction with the lecturers and online students' interaction. Consequently, the total mean of all independent variables for males is higher than that of females at a significant point, where P-value (0.001) is less than  $\alpha=0.05$ . Besides that, the dependent variable (PSS) with a P-value greater than  $\alpha=0.05$ , implies no significant difference between female and male students' satisfaction with online learning.

**Table 6. Independent Sample T-test between Gender Groups**

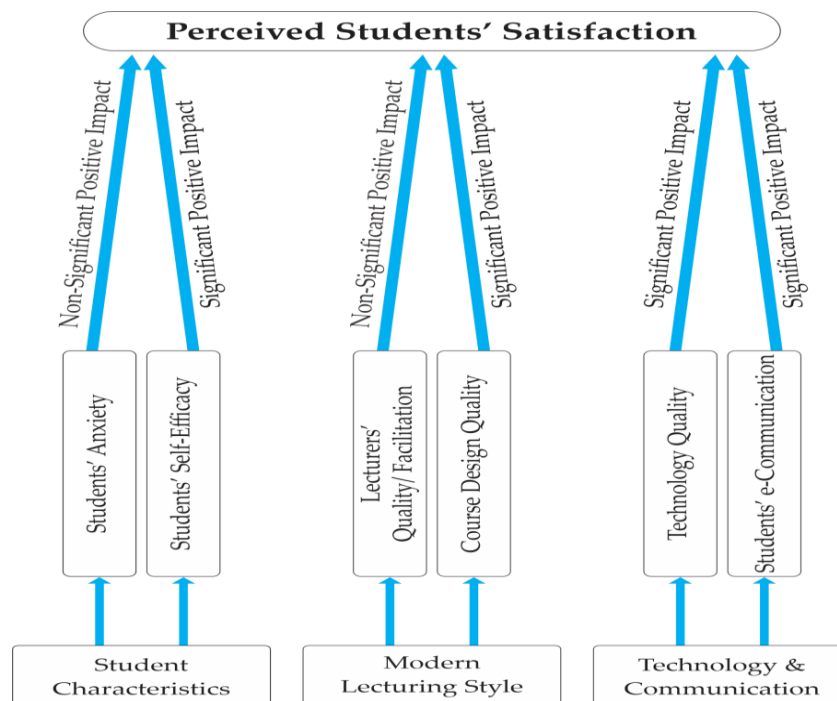
	Gender	N	Mean	Std. Deviation	t	P-value
SA	Male	364	3.587	0.874	5.726	0.001
	Female	349	3.201	0.926		
SSE	Male	364	3.517	0.989	3.809	0.001
	Female	349	3.233	1.005		
LQ	Male	364	2.971	0.900	2.255	0.024
	Female	349	2.815	0.940		
CDQ	Male	364	2.935	0.994	0.851	0.395
	Female	349	2.872	0.982		
TQ	Male	364	2.924	0.897	1.611	0.108
	Female	349	2.812	0.965		
SEC	Male	364	2.863	0.997	2.597	0.011
	Female	349	2.658	1.103		

IVs	Male	364	3.111	0.733	3.306	0.001
	Female	349	2.919	0.822		
PSS	Male	364	2.851	1.238	1.713	0.087
	Female	349	2.694	1.201		

The summary of the results is shown in Table 7, and Figure 2 reflects the obtained results on the conceptual framework.

**Table 7. Hypotheses Test Results**

Hypotheses	Explanatory Variables	B	Remark
1	Lecturers Quality/ Facilitations		NO
2	Course Design Quality	0.429	YES
3	Technology Quality and Service	0.289	YES
4	Students e-Communication	0.372	YES
5	Students Technology Anxiety		NO
6	Students Technology Self-efficacy	0.104	YES



**Figure 2: Model Paths**

## 7. Discussion

In previous studies, some researchers compared female and male students only concerning their levels of satisfaction, but the analysis of this research, examines the relationship between two groups of students, not only in terms of their ultimate satisfaction but all the factors that relate to their satisfaction. The analysis results show that there is no major difference between male and female students 'satisfaction levels, but interestingly female students show more anxiety and less self-confidence while using technology for education. They are less favorably



disposed to online communication and also to lecturers' online facilitation. Evaluation of the research findings is further detailed in the sections below:

### **A. Modern Lecturing Style**

How lecturers facilitate online learning programs by providing definitions of curricula, various assessments, and the way they communicate with students over the Internet, including responding to students' concerns in a timely and appropriate manner and guiding them individually, are factors that students are satisfied with moderately. Nevertheless, lecturer quality has an insignificant impact on students' satisfaction. This finding does not support the results of prior studies [5][1] that stated the role of lecturers in the success of online courses, as a key determinant, significantly impacts student satisfaction. Meanwhile, students put more focus on the course design quality in terms of necessary activities offered to them online, and the electronic materials provided for students including recorded sessions, handbooks, etc., the grading methods, all of which had suddenly been transferred from a classroom approach to online methods via the Internet, as well as the times of online classes, are among the controversial factors. Therefore, the contents of the online courses and the quality of their design by lecturers, which scored moderate satisfaction, remain the top factor that significantly impacts their satisfaction. This result is in line with other research findings, which turned out to be the most influential factor that impacts students' satisfaction [6][5][7].

### **B. Technology and Communication /Interaction**

Over the last decade, the government has taken steps to strengthen the technological infrastructure and has made some progress in this regard, but as is obvious from this survey result, this progress falls short of being satisfactory, and it is still a vital factor in the process of digitalization. The quality of Internet access and the problem of power outages are among the most common problems developing countries, including the KRI, are still struggling with. Consequently, the significant influence of student agreement with the quality of technology on the levels of student satisfaction and their moderate responses have also made it an important factor that needs to be addressed for further improvement. Moreover, communication among students over the Internet is another vital factor that has a significant influence on students' satisfaction; students' interaction in the online environment through e-learning tools, a feeling of being part of the community of students while learning remotely, as well as opportunities to learn from each other, makes this factor an important one that affects students. Students' agreement with this factor in comparison to other factors is the lowest. As the data from this sample show, the population is too young, and this may have made them put emphasis on having more interaction with each other. These findings are consistent with previous research that has pointed out the importance of these factors in increasing student satisfaction with e-learning [18][7][1].

### **C. Student Characteristics**

Following the government plan to expand e-government and raise capacity building in the region in recent years, the education sector is one of the e-government's main objectives. Computer courses have been added to the high school and university curricula, Internet facilities provided in remote areas, and lowering prices to be accessible for everyone have increased the opportunity to raise people's computer literacy. As a consequence, both factors of student anxiety and self-efficacy in this study have the highest responses respectively in contrast to other factors. The stance of students towards their comfort or levels of anxiety in applying technology, especially online education platforms, has been examined, and it turns out that KRI students to a fair degree feel very comfortable using the technology. Although this factor scored high responses from students, it does not play a significant role in increasing students' satisfaction. Anxiety is one of the less investigated factors, in which, the result of this study does not corroborate previous studies in the literature, where anxiety is counted as one of the major factors that significantly impact e-learners' satisfaction [19]. However, the level of students' self-reliance and their ability to use technology, after anxiety, is the highest and has a significant influence on student satisfaction with their online experience. The results of the analysis show, that students' Self-efficacy stands at the lowest level of significance compared to other identified significant factors. Generally, these research results reveal that students focus more on interaction, technology, and the design of the course.

During the interview, several students were given the opportunity to express their opinion using semi-structured questions, where students are questioned as to whether they are satisfied or dissatisfied with their online experience and what affects their opinion. While some of the students were not satisfied with online learning, they identified a lack of interaction with their peers as one of the major challenges they faced. As one of them mentioned, "I am not satisfied with my online experience, I do not have a problem with online classes in terms of facility of technology and also the lack of good implementation of class content for learning is not mattered at all to me, what bothers me more than anything is that I am away from campus and not attending the classes, I cannot feel I am a student when I am not on campus. It makes me distracted and I cannot focus during the online classes at home".

Multiple students announced dissatisfaction or indifference toward online learning. Several students who were living in remote areas pointed to a lack of proper internet connection, power outages during the sessions, and holding classes at different times as the major hindrance to their education, as explained one student, "it was ridiculous, the classes were held at different times and this program was against my daily routine; for example, some days during the holly Ramadan I had to wake up early in the morning or sometimes I had to wait to attend the class at night", another one noted, "it was not easy to communicate with others; there is a large number of students in my class and some classes were already recorded by lecturers, we had no chance of discussion".

On the other hand, there were students who enjoyed their online learning, as some of them mentioned, "I can say I am satisfied; it was first annoying but later I realized some activities like quizzes, exams, reports that lecturers asked us to do on a weekly or daily basis helped me to study consistently and I did not leave the load until the exam night. I could use recorded classes every time I needed, and it was interesting because I noticed I am missing some points during the sessions and it helped me to understand the lesson better, the bad part of it was when I did not know when I could talk". Another one said, "I am satisfied with my online experience, I got good grades and I was able to pass my course despite lockdown. I could communicate with my classmates better; online interaction was more satisfying to me, especially video conferencing tools such as MS Team and Zoom provided a good chance of interaction while we were distanced. I had almost no problems, I had a good Internet speed, and if I had a problem with power outages or the Internet, I could use my mobile phone, it was very pleasing that I could use e-learning platforms on my mobile and carry it everywhere."

As the result of both interview and analysis shows, students identified the most important reasons behind their satisfaction or dissatisfaction during the online experience, where the online course design, including permanent access to online materials, and the usefulness of online activities, however, result in greater satisfaction.

## **8. Conclusion**

This study identifies important factors affecting student satisfaction through the development of an integrated model to guide the research.

However, by applying a comprehensive model to examine several factors simultaneously, which is one of the significant features of this investigation, this study demonstrates how such a holistic model helps prepare the ground for comparison and the influence of each factor. Following this important point, the elimination of the factor related to lecturer facilitation as an insignificant factor, and at the same time identifying students 'communication with each other as a key factor that increases student satisfaction, indicate that students desire an educational method based on a constructive approach.

Finally, this study provides significant insights for the KRI universities to strengthen the implementation of e-learning to further improve student satisfaction, because unsatisfactory perceptions may hamper students' desire to continue their distance learning. For this reason, and in order to implement a successful e-learning environment, four identified critical factors in this study should not be neglected.

## **9. Recommendations**

Based on the results of this survey, to increase student satisfaction and develop a successful e-learning system, some suggestions are made, which are listed below:

- After the first online learning experience, the KRI universities can continue one of the study subjects online. This provides the basis for improving the level of the e-learning system, and student knowledge will be constantly updated in tandem with the advancement of technology.
- Since the use of educational platforms reached its peak during the Covid-19 period, some students, due to a lack of enough skill in applying e-learning platforms and also dealing with technical problems, face difficulty during online learning programs. As a result, IT service management needs to take measures to further train students and handle students' issues while using e-learning platforms.
- By utilizing more e-learning collaboration tools such as wikis, forums, online discussion tools, etc. after the pandemic, lecturers can provide a more interactive environment for students to learn from each other and also prepare them for similar possible situations.

## 10. Limitations

As a limitation in this study, the factor of quality of online course design, which has been found to be the most critical factor, is still obscure in this research work. Stepwise multiple regressions were used since the goal of the research was to identify vital aspects, so among future tasks, internally developing this critical factor to investigate more elements of it will be required to understand which are the most influential by employing other analytical techniques, such as SEM. However, this research is dedicated to the specific time of the Covid-19 pandemic, and due to pandemic restrictions surveying students in a random manner was not possible, this result cannot be generalized and investigations on influential factors should continue at other times, to discover other critical factors.

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