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Abstract: Educational institutions worldwide have adopted e-learning due to the COVID-19 pandemic. While this shift to online learning (OL) has presented challenges for students and teachers, it has also sparked innovative educational approaches. This study investigates college students' perceptions regarding OL, specifically focusing on gender differences in the experience with OL A quantitative survey gathered information from distinct college students in Gulf Cooperation Council (GCC) nations who experienced OL during the pandemic. The survey included questions related to satisfaction with OL and specific aspects such as course content delivery, interaction with instructors, behavioral changes, and challenges with OL. Male and female student OL experience was compared statistically. The results conclude that male students are more satisfied than female students. Students struggled with internet connection, OL adaptation, focus, and workload during OL. Understanding these gender differences in students' satisfaction with OL is crucial for educators and institutions as they strive to optimize the effectiveness of e-learning strategies. By recognizing and addressing male and female students' unique needs and challenges, educational institutions can enhance the overall educational experience during times of crisis and beyond.

Keywords: COVID-19; higher education; online education; student-centered learning

1. Introduction

Global educational institutions have been compelled to implement e-learning on a massive scale due to the COVID-19 pandemic. It has been a challenge for many students and instructors but has also prompted the development of some novel educational approaches [1,2]. Pandemics and natural disasters should be accounted for in the emergency plans of companies and other entities. In such situations, the performance and efficacy of information and communication technology (ICT) systems and online learning (OL) resources such as massive open online courses (MOOC) and digital books are essential [3,4]. Online learning's SWOC (strengths, limitations, opportunities, and challenges) ought to be assessed along with considering these factors when implementing. The advantages incloude flexibility in locations and times and swift responses.

One must evaluate the tools and educational materials employed to use OL successfully. The institutions must clearly understand how the requirements of students, instructors, and content (LEC) are satisfied [5]. Finding out what students hope to get from their university experience might help educational institutions improve student happiness while boosting their potential for future success [6]. The education process can be carried out in several ways, such as in a synchronous, asynchronous, mixed, or blended format [7]. Because the contact between instructors in synchronous learning is comparable to that in conventional education, and because teachers include gamification in the content of their courses, synchronous learning results in a high degree of learning satisfaction [8,9].

Ensuring every student receives access to the appropriate tools and materials is one of the most challenging issues with OL [10]. Students have, on occasion, been forced to either share electronic equipment with members of their families or rely on public Wi-Fi networks [11]. It has produced equality difficulties since children from families with poorer incomes may have less access to technology due to this. Another problem with OL is offering learners the necessary amount of social engagement. Students can learn from one another and cultivate relationships with their classmates

in a conventional classroom setting. It will not be simple to recreate it online, but certain technologies could make it easier, such as online discussion boards and online forums. Despite the difficulties, OL has resulted in a few positive outcomes. Students, for instance, can learn at their own pace and access material from anywhere in the world. It can be of significant use to students with hectic schedules or who live in rural areas. OL is a beautiful tool that may assist kids in their learning and development. Despite this, it is necessary to find solutions to the problems presented by OL to ensure that every student has a satisfying educational experience [12,13].

The landscape of education is shifting to accommodate newly developed technology. Zoom, Google Meet, and Microsoft Teams were the most popular web conference platforms for OL to deliver instruction. There are a multitude of additional platforms available as well. As a result of computer technology advancements, students can now engage in educational activities anywhere globally, just as they would in a traditional classroom setting [14,15]. The adoption of OL is directly proportional to the degree to which students are pleased with the content and format of their courses [16,17].

Students' preparation level for OL is directly proportional to the kind of schools they attend and the time they spend online. Most students were aware that they might not achieve their educational objectives. On the other hand, students with moderate to high academic performance had a more positive outlook on OL's influence on their intellectual development [18,19]. From a medical standpoint, OL is ineffective because students require face-to-face time with patients to learn [20]. The educational institution can increase learning effectiveness and satisfaction by better understanding the demands of the students [21]. The student's health problems may worsen due to anxiety and tension, affecting their academic performance and ability to study online [22]. Students' psychological impressions of OL were affected by various characteristics, including motivation, self-efficacy, and anxiety.

The abrupt switchover to OL during the pandemic may have impacted students' lecture attendance. Similarly, all classroom-based activities have been shifted to online ones, making curriculum reform the primary responsibility of teachers. Teachers report that children are less engaged than they would be with direct teaching. In a synchronous classroom, teachers can better motivate their students [23]. Due to differences in learning styles, OL might be challenging for learners. An effective learning environment necessitates using both synchronous and asynchronous learning strategies. Their parents' involvement influences students' attitudes and actions toward learning in OL Students are open to using this OL if it has a straightforward interface [24].

Because students will encounter many technical challenges throughout their education, educational institutions are responsible for providing them with training and digital support whenever required. In addition, not every student is at ease with acquiring knowledge online. It's possible that the setting they have will determine the level of comfort they have. For instance, they could not locate a peaceful location, which resulted in disruptions throughout their scheduled class time. As a result, educational institutions ought to ensure that all students have access to the relevant materials and classes [25]. Another obstacle is getting permission to use the camera during class time. Many students experienced discomfort due to social difficulties, such as the environment not reflecting their culture [26].

It's conceivable that OL remained employed even after the COVID-19 pandemic slowed down. However, for OL to be successful, it is essential to consider many factors. It includes the quality of the e-learning platform, quality of the content, support of teachers and staff, accessibility, and engagement of students [27]. A critical behavioral strategy that might maximize the relationship between motivation and task performance is self-assessment practice [28]. According to Tran and Nguyen [29], three variables contribute to an improvement in a student's overall level of happiness with their OL: the efficiency of the course, the provision of knowledge and skills, and an impression of participation.

This study aims to test how male and female students from different colleges are satisfied with the OL. The survey was distributed to various students in the Gulf Cooperation Council (GCC) countries by the Secretariat of the E-learning Officials Committee at Arab Gulf Cooperation Universities and Higher Education Institutions. During the pandemic, nearly all educational

institutions utilized synchronous online learning (SOL), asynchronous online learning (AOL), or blended online learning (BOL), a combination of SOL and AOL. While many studies have evaluated students' satisfaction with online education in general, this study focuses on Arab male and female students to determine satisfaction with OL with gender differences. The study's results could help improve the OL experience for all students, regardless of gender. Thus, the research questions (RQ) are as follows:

- RQ1: Do the students improve any skills during the OL?
- RQ2: How the factors like satisfaction, interaction, challenges, teaching style, and health issues affect the perception of OL for male and female students?

The article is organized in the following manner: Section two discusses the study hypotheses. The third section presents the research process and design. Section four analyzes the data, while section five explores and discusses the OL from the students' perspective, followed by future plans. Lastly, the conclusion is briefly discussed in the final section.

2. Research Hypotheses

During the process of constructing the conceptual framework for our study, we generated our null hypotheses based on the research questions, which are listed below.

H1: There is no significant association between gender and OL methods (synchronous, asynchronous, and blended).

H2: There is no significant association between gender and computer experience (beginner, intermediate, and expert).

H3: No significant association exists between the OL experience for male and female students before the pandemic.

H4: There is no significant difference between the male and female students' satisfaction levels concerning OL.

H5: There is no significant difference between the male and female students' levels of interaction during the OL.

H6: No significant difference exists between male and female students' behavioral changes or health issues during OL.

H7: There is no significant difference between the male and female students' levels of OL challenges during learning.

H8: There is no significant difference between the male and female students' levels of teaching style perception during the OL (including the content quality).

3. Materials and Methods

Figure 1 presents a visual representation of the study's methodology. The stages include hypotheses creation (as above), research design, choosing the data collection method, data collection, analysis, and hypotheses evaluation.
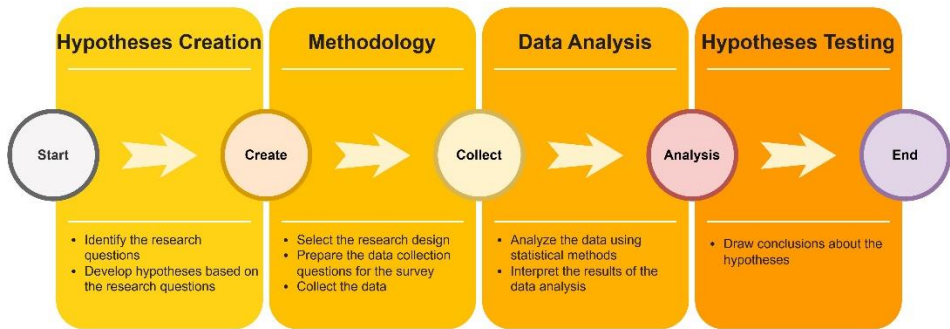

Figure 1. The framework of the study.

The online questionnaire poll is sent to universities and colleges in all GCC countries by the Arab Gulf Cooperation Universities and Higher Education Institutions Secretariat. The questionnaire has multiple-choice and Likert scale questions. The data was gathered between June and December 2021 through Google surveys, and the responses to questionnaires were submitted by students attending various educational institutions located among the GCC's six member states. The Kingdom of Saudi Arabia, the United Arab Emirates (UAE), the Kingdom of Bahrain, Kuwait, the Sultanate of Oman, and Qatar are these countries. The questionnaire covered five topics: interaction, satisfaction, teaching style, challenges, and health problems. The range of responses for each Likert scale question is from one to five (from strongly disagreeing to strongly agreeing).

The research is being done with a quantitative approach as its technique. To accomplish this goal, it will first compile the quantitative information the students provided and then analyze the hypotheses statistically. The sampling method used for this research was known as convenience sampling [30]. There are numerous benefits associated with convenient sampling. First, it is a relatively simple and economical sampling method. Second, it can rapidly collect information from many participants. Thirdly, it can collect data from a particular population, such as college students in GCC nations.

The data was examined using Statistical Package for Social Sciences (SPSS) version-29 [31]. Table A1 (Appendix A) illustrates the mean value and the standard deviation (std deviation) for each construct. The interaction construct has seven items, which deal with the communication between peer students, teachers, parents, and institutions (as shown in Figure 2). Almost all students are satisfied with interacting with their teachers or institutions during their OL.
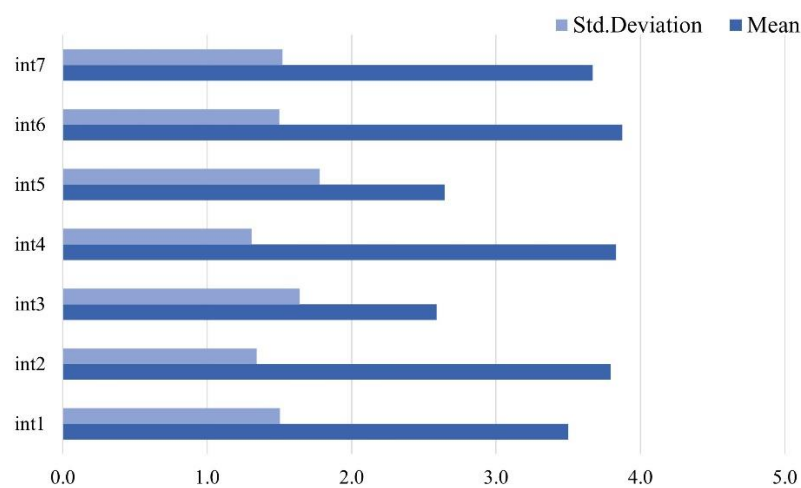

Figure 2. Mean and std deviation for the interaction construct.

The satisfaction construct contains six items, as described in Figure 3. The students are delighted with the OL method preferred by their institution. Even the students prefer to use OL in their future curriculum if provided.
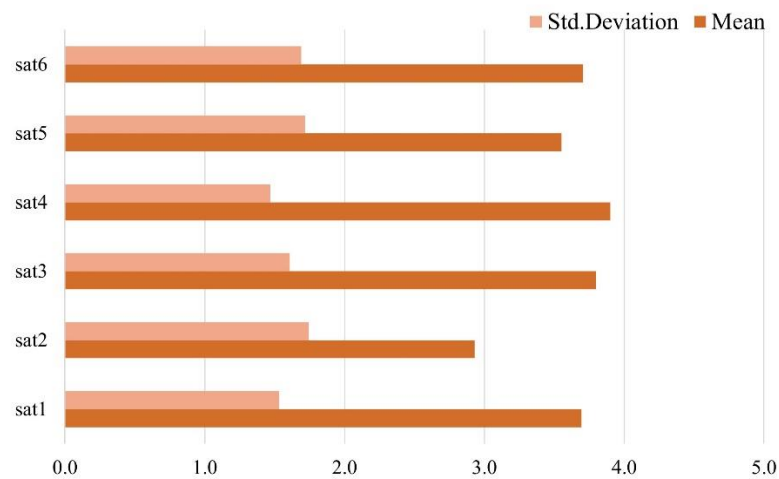
Figure 3. Mean and std deviation for the satisfaction construct.

Each student has different challenges on OL during the COVID-19 pandemic. It includes their concentration, isolation, workloads, and much more, as in Figure 4. The students mentioned that they were not disturbed during class hours by other students in OL (cha6). Most of the queries have responses marked as neutral to agree.
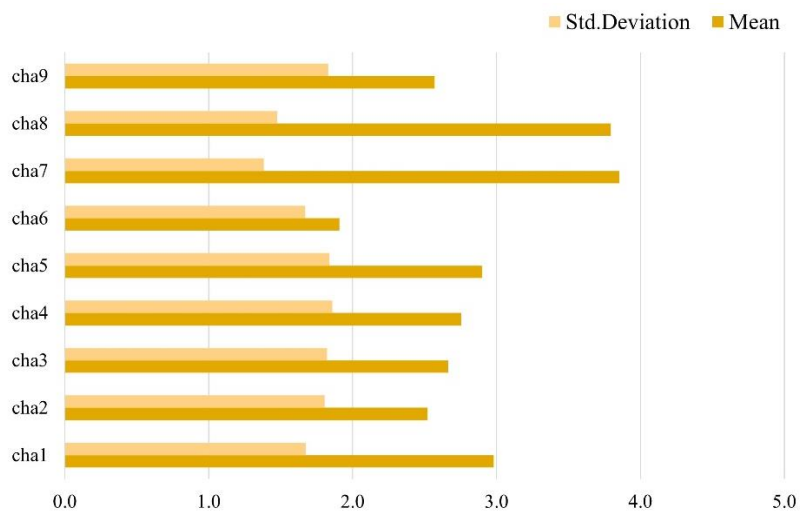

Figure 4. Mean and std deviation for the OL challenges construct.

The numbers in Figure 5 show that many students are having health problems. Anxiety or stress is the most common health problem, followed by less physical exercise and frequent health problems like headaches, blurred vision, and back pain. Some students also said they felt shy or worried when taking online classes with a camera.
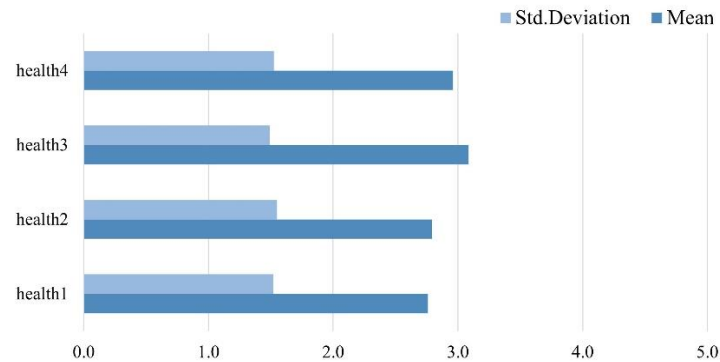
Figure 5. Mean and std deviation for the health construct.

Lessons offered during online education may change from one instructor to the next and from topic to topic. Almost all students liked the content delivered style by their teachers or professors, as shown in Figure 6.
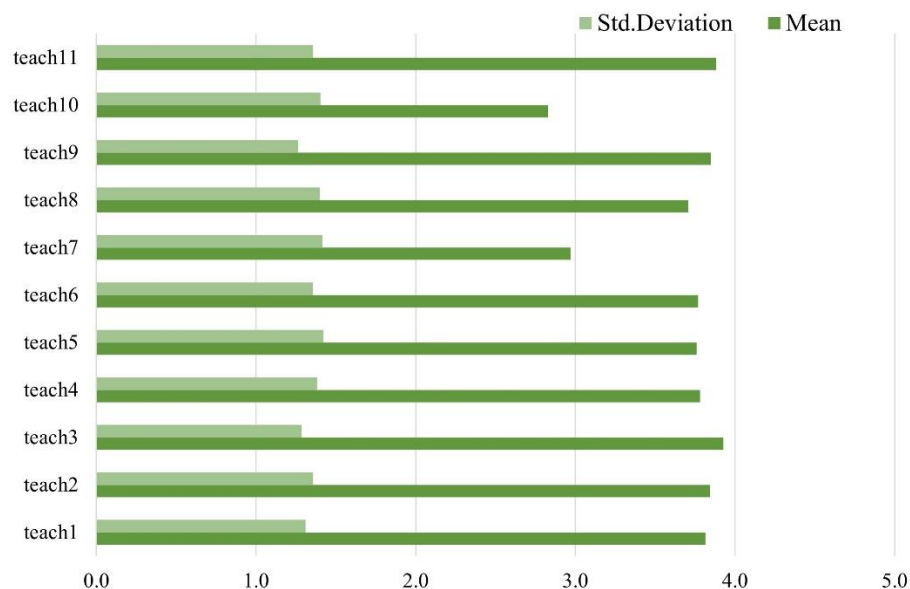

Figure 6. Mean, and std deviation for the teaching style construct.

Other than the constructs, specific demographic and categorical responses were also collected from the students. It includes gender, grade, country, computer literacy, OL method employed during learning, information about the e-library provided during OL, and OL experience before the pandemic.

3.1. Hypothesis Evaluation

We conducted an ordinal regression analysis for questions based on the Likert scale. The dependent variable is an ordinal or Likert scale score, while the independent variable is categorical [32,33]. Cronbach's alpha measures construct internal consistency. The closest alpha value to 1 is more reliable. If the value is above 0.7, reliability is satisfactory [34]. Table 1 shows that all survey constructs are reliable.

Table 1. Internal reliability of the constructs.

Constructs	Cronbach's Alpha	Items
Interaction	0.708	7
Satisfaction	0.770	6
Health issues	0.840	4
Challenges	0.817	9
Teaching Style	0.908	11

4. Results

Responses from 8,895 students were gathered from various GCC countries. Over half (4803) of the students responded were female (54%), whereas 46% were male. No responses were received from college students in Qatar, while 64.2% were from Saudi Araba, 29.7% from Kuwait, 6% from Bahrain, and 0.1% each from Oman and UAE, respectively. The complete data analysis based on gender is described in Table 2. Most females (49.65%) and males (43.61%) fall into the "Undergraduate" category. 94.05% of responses are from public or government institutions, while 5.95% are from private institutions. Of females, 36.23% had no prior OL experience before the pandemic, while 17.76% had previous exposure. On the other hand, the percentages for males were 31.48% and 14.53%, respectively. E-library usage is relatively high, with 25.72% of females and 24.96% of males using e-libraries regularly. Additionally, 17.27% of females and 13.15% of males utilize e-libraries occasionally. Of the total responses, students with SOL learning were 65.93%, 26.15% with BOL, and 7.92% with AOL.

Table 2. Description of data based on gender.

		Female		Male	
		Count	%	Count	%
Country	Kuwait	1379	15.50%	1261	14.18%
	Oman	6	0.07%	1	0.01%
	Saudi Arabia	3070	34.51%	2637	29.65%
	Bahrain	343	3.86%	189	2.12%
	UAE	5	0.06%	4	0.04%
Grade	Graduate	387	4.35%	213	2.39%
	Undergraduate	4416	49.65%	3879	43.61%
Institution	Public	4485	50.42%	3881	43.63%
	Private	318	3.58%	211	2.37%
Any OL experience before the pandemic	No	3223	36.23%	2800	31.48%
	Yes	1580	17.76%	1292	14.53%
E-library usage	No	979	11.01%	702	7.89%
	Yes	2288	25.72%	2220	24.96%
	Occasionally	1536	17.27%	1170	13.15%
Computer experience	Beginner	420	4.72%	477	5.36%
	Intermediate	2877	32.34%	2329	26.18%
	Expert	1506	16.93%	1286	14.46%
OL method	SOL	3052	34.31%	2813	31.62%
	BOL	1439	16.18%	887	9.97%
	AOL	312	3.51%	392	4.41%

4.1. Hypotheses Analysis

The chi-square test represents a non-parametric test that ignores any assumptions about how the data should be distributed. It is possible to determine whether or not two category variables are connected by employing the chi-square test of independence [35]. The null hypothesis states that the two variables have no significant relationship. We can conclude to accept the null hypothesis if the p-value is higher than 0.05; else, reject it.

The chi-square test analysis is represented in Table 3. The gender variable with the categories OL methods (H1 hypothesis) and computer experience (H2) shows a p-value below 0.05; hence, we reject the null hypothesis. Thus, it offers a significant association between these variables and male and female students. However, OL experience before the pandemic has no relationship with the gender variable (H3), as the p-value is higher than 0.05; hence we accept the null hypothesis.

Table 3. Chi-square test for categorical variables.

Model	Hypothesis	Chi-square	p-value*
Gender-OL methods	H1	93.595	0.000
Gender-computer experience	H2	21.950	0.000
Gender-OL experience before the pandemic	H3	1.767	0.184

* Significant value=0.05.

An ordinal regression analysis was carried out to verify the construct hypotheses, and the findings are presented in Table 4. The gender variable is considered in the study of the model. There is a null hypothesis in the information about fitting the model. This hypothesis states that there is no significant difference when comparing the initial model (which did not include any independent variables) to the final model (which did have an independent variable). We accept the null hypothesis when the p-value>0.05 (significant value). It is recommended that the null hypothesis in the model fitness table should be rejected so that the model can be correctly used for analysis.

Table 4. Model fitting information with the gender and the constructs.

Model	Chi-square	Significance*
Gender-Interaction	102.505	0.000
Gender-Satisfaction	190.092	0.000
Gender- Experience	39.497	0.000
Gender-Health issues	140.841	0.000
Gender-Teaching style	169.650	0.000

* Significant value=0.05.

We analyze the parameter estimate table to find the relationship between the outcomes. It is an essential interpretation of the hypothesis analysis. Table 5 represents the analysis of ordinal regression with the constructs. The male parameter is considered a reference parameter and is valued as zero. When the estimated value is negative, there is less acceptance level than the reference parameter. The null hypothesis states no significant difference in location parameters (gender) towards the response parameters (constructs). It is accepted when the p-value (significant value) exceeds 0.05. From Table 5, we conclude that all hypotheses are rejected, as the p-value is less than 0.05.

Table 5. Parameter estimates of gender with the constructs.

Response parameter	Location parameter	Hypothesis	Estimates	p-value	95% Confidence Interval	
					Lower bound	Upper bound
Satisfaction	Female	H4	-0.512	0.000	-0.585	-0.439
	Male		0^a			

Interaction	Female	H5	-0.375	0.000	-0.448	-0.303
	Male		0[a]			
Health issues	Female	H6	0.441	0.000	0.368	0.514
	Male		0[a]			
Challenges	Female	H7	0.233	0.000	0.161	0.305
	Male		0[a]			
Teaching style	Female	H8	-0.483	0.000	-0.556	-0.410
	Male		0[a]			

a This parameter is set to zero because it is the reference parameter.

5. Discussion

The study focused on different aspects of OL from the male and female students, who are graduates and undergraduates from GCC nations. A total of 8,895 responses were collected through an online survey, which was distributed by the Secretariat of the E-learning Officials Committee at Arab Gulf Cooperation Universities and Higher Education Institutions. Around 46% were male students, and the remaining 54% were female. The gender variable has a significant relationship with the OL methods like SOL, AOL, and BOL with the p-value <0.05 (H1 rejected). Also, the computer experience with gender has a p-value<0.05 (H2 rejected), and Figure 7 shows that males have an average computer experience of 2.197. In contrast, females have an average computer experience of 2.226. According to this, females, on average, have slightly more experience working with computers than males. However, the proximity of the confidence intervals indicates that any variation in mean computer experience is likely to be minimal.
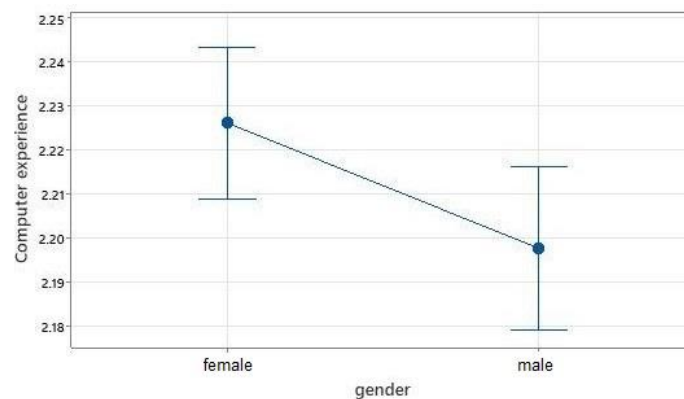

Figure 7. Interval plot of gender with computer experience (95% confidence interval).

There is no association between gender and OL experience before the pandemic (p-value>0.05, H3 accepted). The students thought that they had improved a variety of skills throughout the OL, including their listening ability, reading, speaking, and writing abilities, as well as many other skills, as shown in Figure 8 (RQ1). Around 60% of female and 67% of male students showed increased listening skills, followed by time management (50% and 47% for male and female students, respectively). On the other hand, 19% of female and 13% of male students responded that they never felt any changes.
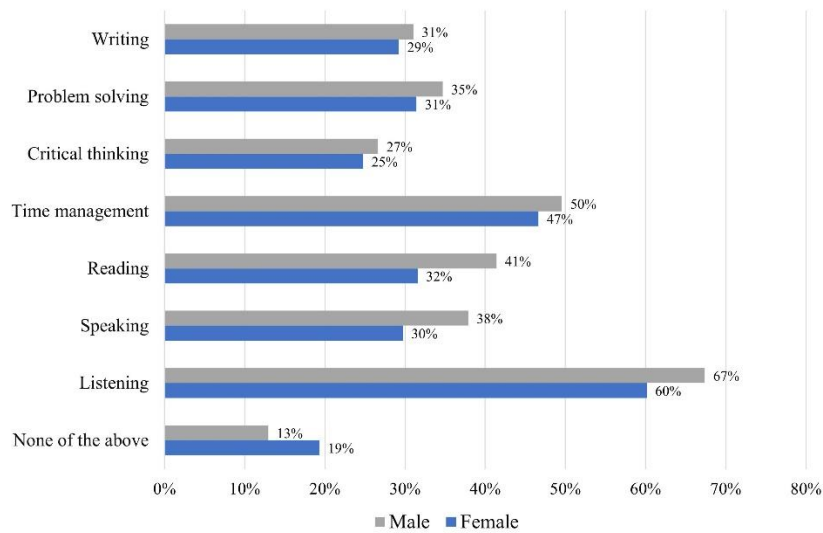
Figure 8. Improved skills according to male and female students during OL.

The importance of the institutional support given to the students and instructors during the OL cannot be overstated. Students' mental states should be considered during OL, and teachers are responsible for motivating students to overcome these challenges [36]. Student satisfaction is the most crucial indicator of a successful educational experience, whether in a traditional classroom or virtually [21]. The instructor can create the course content better if the factors affecting learning efficacy are identified [37]. Studies have shown that students' satisfaction with OL is influenced by various factors, including their learning style, prior experience with OL, and the level of support they receive from the instructor and the institution [38–40]. Students who are satisfied with OL tend to be more engaged and successful in their studies. Interaction between teachers and students during OL is essential for a successful learning experience.

The ordinal regression for the constructs showed that all factors, such as interaction, satisfaction, challenges, health, and teaching style, significantly differed between the male and female students' acceptance levels. The p-value is less than 0.05 for all the constructs; hence, H4, H5, H6, H7, and H8 are rejected. The estimated value can be observed from the parameter estimate in Table 5. The exponential of this value shows how the acceptance level of female and male students differs, as depicted in Figure 9. The reference variable is male students, and hence the value is 1. Female students are less satisfied than male students by 0.599 times. Also, female students' interaction and teaching style acceptance are 0.687 and 0. 617 times less than male students, respectively. During the OL, female students encountered more problems than male students regarding health and challenges, with 1.554 times and 1.262 times, respectively. It can be due to cultural expectations, home environments, and health-related factors.
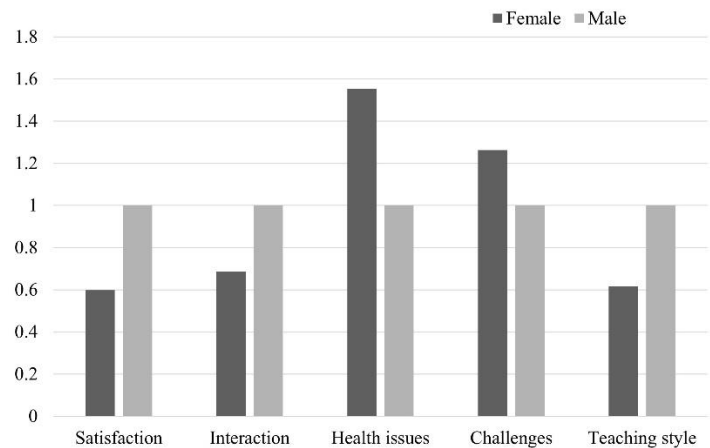
Figure 9. Acceptance of OL according to male and female students with different constructs.

5.1. Limitation and Future Work

This study has a limitation that can be attributed to the fact that the sample of students had very few or no replies from Oman, the UAE, and Qatar. In the subsequent study, there needs to be a greater inclusion of samples to ensure a broader representation. In addition, the following phase includes the possibility of researching the various learning styles of the students, which can then be applied to the process of individualizing the educational experience for each student. Teachers can better meet their student's needs and learning styles by considering these factors as they develop lesson plans and course content. This method creates a more stimulating and productive classroom setting, improving students' knowledge and retention.

6. Conclusions

This study examines college students' OL experiences, concentrating on gender differences. 8,895 GCC nation students were surveyed statistically. Based on the data, we can infer that male students are more satisfied than female students. Most students felt that technical connection issues, heavy workload, lack of concentration, isolation, and difficulty adapting to OL were some of their main challenges during their learning. The differential experiences between female and male students regarding health and challenges during the OL can be influenced by various factors, including sociocultural norms and health-related factors. Addressing these issues requires a multifaceted approach, including providing comprehensive healthcare services and a supportive environment to create a more inclusive and supportive educational environment for all students.

While OL is anticipated to continue in the next generation of education, gender-specific factors must be considered to ensure equal access, accommodate diverse learning preferences, and encourage a gender-inclusive and bias-free learning environment. By resolving these factors, OL can contribute to a more equitable and effective learning environment for students, regardless of gender.

Appendix A

Table A1. The constructs with mean and std deviation for each item.

Construct	Question	Mean	Std Deviation
Interaction	int1: During class time, I engage with other students.	3.502	1.503
	int2: During OL, I frequently communicate with my instructors.	3.794	1.342

	int3: Outside of scheduled class times, there is no way to communicate with the instructors.	2.587	1.639
	int4: The teacher interacts well with students.	3.832	1.307
	int5: There is insufficient parent-teacher communication.	2.645	1.778
	int6: My parents at home support me in my academic endeavors.	3.874	1.499
	int7: My institution offers me the assistance I need for OL.	3.671	1.521
Satisfaction	sat1: I am pleased that my teacher cannot see me when I am learning.	3.695	1.533
	sat2: I miss having other students around when I'm learning.	2.930	1.744
	sat3: I am pleased with the OL format.	3.797	1.609
	sat4: During the COVID-19 pandemic, the OL platform's existing functions satisfied my learning demands.	3.901	1.469
	sat5: Online education is more appealing than traditional classroom education.	3.551	1.716
	sat6: If OL becomes an elective in the future curriculum, I will continue to use it.	3.704	1.691
OL challenges	cha1: I lose connection during live broadcasts, impairing my understanding.	2.982	1.673
	cha2: I am occasionally unable to locate a quiet space at home. Consequently, I am unable to concentrate.	2.521	1.805
	cha3: I always have difficulty concentrating on the computer.	2.664	1.823
	cha4: As a student, I felt more alone.	2.754	1.860
	cha5: Excessive workload and assignments in contrast to classroom instruction.	2.899	1.841
	cha6: I am annoyed by other students during online lecture hours.	1.909	1.671
	cha7: I can inquire about questions to talk about various topics.	3.853	1.383
	cha8: I can attain my desired Score through online learning.	3.794	1.474
	cha9: OL is more difficult to adapt than face-to-face learning.	2.570	1.830
Health issues	health1: My anxiousness or stress amount has risen.	2.759	1.520
	health2: I am less active than I used to be.	2.792	1.550
	health3: I frequently experience health issues such as migraines, blurred vision, and spinal discomfort.	3.084	1.490
	health4: I experience shyness or anxiety when joining classes online with a camera present.	2.959	1.525
Teaching style	teach1: The course's instructional method aided my comprehension of the concept.	3.815	1.309
	teach2: I loved the course's instructional style	3.843	1.358

teach3: The method of instruction was adaptable and straightforward.	3.926	1.284
teach4: The instructional method assisted in my educational advancement.	3.782	1.382
teach5: The instructional method inspired me to study more.	3.759	1.423
teach6: The teaching approach was in line with my expectations.	3.770	1.357
teach7: The instruction lacked sufficient opportunities for discussion.	2.969	1.414
teach8: The method of instruction increased my desire to study the topic.	3.708	1.399
teach9: The instructor's instructional strategy facilitated my achievement of course objectives.	3.849	1.264
teach10: The activities and examples did not adequately convey the course's educational content.	2.828	1.404
teach11: Overall, the teaching style was outstanding.	3.882	1.358

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