Article

E-Learning Experience in Higher Education amid COVID-19: Does Gender Really Matter in A Gender-Segregated Culture?

Mansour A. Alyahya [1] , Ibrahim A. Elshaer [1,2] , Fathi Abunasser [3], Osama H. Mahmoud Hassan [4,5] and Abu Elnasr E. Sobaih [1,6,*]

1   Management Department, College of Business Administration, King Faisal University,
    Al-Hassa 31982, Saudi Arabia; malyahya@kfu.edu.sa (M.A.A.); ielshaer@kfu.edu.sa (I.A.E.)
2   Faculty of Tourism and Hotel Management, Suez Canal University, Ismailia 41522, Egypt
3   Department of Educational Leadership, College of Education, King Faisal University,
    Al-Ahsa 31982, Saudi Arabia; fabonasser@kfu.edu.sa
4   Graduate Studies and Scientific Research, King Faisal University, Al-Ahsa 31982, Saudi Arabia;
    ohhassan@kfu.edu.sa
5   Department of Mathematics, Statistics and Insurance, Sadat Academy for Management Sciences, Maadi,
    Cairo 12411, Egypt
6   Faculty of Tourism and Hotel Management, Helwan University, Cairo 12612, Egypt
*   Correspondence: asobaih@kfu.edu.sa

Abstract: Despite a plethora of research on students' experiences of electronic (e) learning amid COVID-19 in higher education institutions (HEI), limited research has recognized the differences between students based on their gender. This research aims to examine the differences between students regarding their e-learning experiences amid COVID-19, especially in a gender-segregated culture where female students do not have full access to conventional learning as their male counterparts do, albeit they often have more access to technology-based learning. A total of 1200 online questionnaires were analyzed from students (600 male and 600 female) in public universities in Saudi Arabia, which tend to use Blackboard to sustain their communication with students and e-learning amid COVID-19. The results of structural model and multi-group analysis using AMOS supported all the research hypotheses. The results showed that the path coefficients and significant values were higher among female students than among male students. Additionally, the explanatory power of the male structural model regarding the e-learning experience (0.58) was lower than that of the structural model of female students (0.85), reflecting a higher explanatory power to explain the e-learning experience. The research findings have numerous theoretical and practical implications, especially in gender-segregated cultures.

1. Introduction

The World Health Organization declared the novel coronavirus disease (COVID-19) as a global pandemic in the first quarter of 2020. The pandemic affected the whole world; hence, higher education institutions (HEIs) were suspended for an unknown period. Due to the extremely contagious nature of the virus, distance learning was the sole solution for HEIs to ensure social (place) distancing. To cope with the pandemic [1], HEIs moved traditional classrooms into virtual environments. Distance or remote learning ensures safe spaces and adopts a virtual environment for learning through online classes [1]. The term "e-learning" stands for electronic or internet-based learning using formal digital learning management systems (DLMS), e.g., Blackboard and Moodle [2]. These DLMS were made to make it easier for people to learn online and to give them a good virtual learning experience that is similar to what people get in traditional classrooms [3]. Many public

HEIs, particularly in developing countries, were unable to implement these DLMS due to a lack of resources and financial support [4]. Hence, they adopted free digital collaborative platforms, e.g., ZOOM or Google Classroom, or social networking sites, e.g., Facebook and WhatsApp, to sustain their educational process [5].

Several research studies [6–14] were undertaken to highlight the actions taken by HEIs to cope with COVID-19, especially in relation to students' perceptions of e-learning. For example, researchers [6,10] highlighted the opportunities and challenges of e-learning, focusing mainly on a developing country context; others [2,4–6] examined the value of different digital platforms for e-learning in the absence of DLMS, e.g., collaborative digital platforms or social network sites. Research confirmed that HEIs need to make changes in curricula to fit with the new approach of learning [6]. This is because e-learning does not only differ from traditional classroom teaching in the medium of learning, but also significantly impacts the learning approach [15]. Other studies were undertaken to address students' e-learning experiences amid COVID-19 [2,8,11,14]. However, these studies did not sufficiently examine whether the gender of students influences their e-learning experience, especially in Arabic culture, where female students are segregated into different classes and are not mixed with male students [16].

This research empirically examines students' e-learning experiences in HEIs. The research also examines whether gender really matters in the e-learning experience, especially in gender-segregated societies, e.g., in Saudi Arabia, where there is mixing between men and women. Thus, female students in HEIs in these societies often do not have face-to-face interaction with their lecturers in normal classes if they are male [16]. This research examines whether female students have different e-learning experiences from male students based on their different experiences before COVID-19. The research highlights how a positive e-learning experience could be created for both male and female students post COVID-19.

2. Theoretical Foundation and Hypotheses Building

2.1. Gender and Perceptions of E-Learning in a Gender-Segregated Culture

Gender segregation is part of Saudi Arabia's social and religious beliefs [16]. Hence, gender segregation is evident in public and private institutions. This includes HEIs, where female students are segregated from male students to ensure no mixing of gender. The mixing of genders is a sensitive and critical issue in Saudi society, including the virtual environment [16–18]. Female students tend to be segregated from male students throughout their education and receive separate education with no direct contact with any males, including their male tutors or lecturers [16]. In cases where there is a male tutor, they used to interact through a medium, e.g., virtual environment. Research [17] on Saudis showed that cultural and religious factors led to several barriers to higher education for Saudi women, who used to have limited places in universities in comparison to men. However, the Saudi Vision 2030 aims to empower women and provide equal opportunities for women, including access to education [19]. For example, the Saudi government has officially stated that "*the number of females enrolled in higher education institutions in 2015 (749,375) compared to the number of males enrolled in higher education institutions (778,394)*" [19].

Research [16,20,21] on gender-segregated cultures, such as Saudi Arabia, has shown that e-learning improves women's access to higher education. Despite this, Alhazmi and Nyland [16] argued, "*the main factors that limit access of Saudi women to e-learning are social and religious beliefs, especially male authority, segregation, and family honor*" (p. 646). Therefore, it is vital to consider this culture and these beliefs when designing e-learning programs [16,22]. The gender of lectures is crucial since communication with unrelated males is forbidden. Any courses provided by a male lecturer are unacceptable by the women's family [23]. For these reasons, women and their families favor the asynchronous method of e-learning, which limits the direct interaction with male lecturers and/or students [24].

2.2. Students' E-Learning Experience amid COVID-19

In response to COVID-19, e-learning became the main tool for HEIs [1]. HEIs have paid appropriate attention to the e-learning experience of students [2–4]. Research [7–14] on students' perceptions of e-learning in higher education amid COVID-19 showed some factors that affected their experience. Distance and/or e-learning gives students the chance to get information and resources several times at their own pace. Students' participation in the e-learning process is crucial for creating an e-learning experience, especially with the support received from their tutor and other peers, which helps them get engaged in e-learning [8]. For example, Al-Balas et al. [12] found that students in medical schools were more satisfied with e-learning when they took part in activities that were streamed live or used multimedia. Research also confirmed that students find it easy to submit their work for assessment [25], but they are concerned about receiving proper feedback, especially with practical courses for students in medical science [26]. Additionally, it is also vital that e-learning balances theoretical and practical knowledge to ensure personal reflection in students [14]. These factors are summarized in the research conceptual framework (Figure 1).
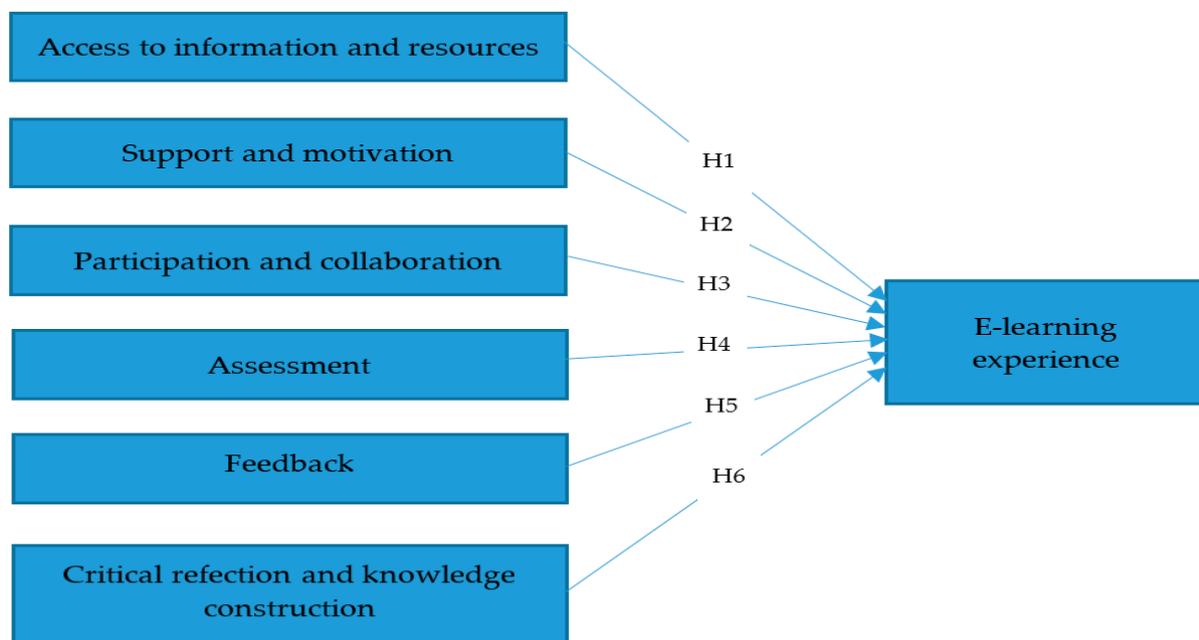

Figure 1. The research conceptual model.

Research on the differences in students' experiences based on their gender amid COVID-19 remains very limited. Few published studies have examined the differences in perceptions of e-learning or e-learning experiences between male and female students. For example, female medical students were found to have more positive experiences with e-learning than male students [8], whereas another study showed no significant differences between students' experiences with e-learning amid COVID-19 based on their gender [9]. The current research expects significant differences between male and female students in their e-learning experiences, especially in gender-segregated cultures where females often received technology-based learning before COVID-19 [16]. These differences in perceptions and e-learning experience are assumed since female students often do not have conventional education face-to-face in this gender-segregated culture, and hence are more likely to be familiar with e-learning than male students [18]. Based upon the above discussion, it could be hypothesized that:

Hypothesis 1. *There are statistically significant differences between males and females in the relationship between access to information and resources and their e-learning experience.*

Hypothesis 2. *There are statistically significant differences between males and females in the relationship between students' support and motivation and their e-learning experience.*

Hypothesis 3. *There are statistically significant differences between males and females in the relationship between students' participation and collaboration and their e-learning experience.*

Hypothesis 4. *There are statistically significant differences between males and females in the relationship between students' assessments and their e-learning experience.*

Hypothesis 5. *There are statistically significant differences between males and females in the relationship between students' feedback and their e-learning experience.*

Hypothesis 6. *There are statistically significant differences between males and females in the relationship between students' critical reflection and knowledge construction and their e-learning experience.*

3. Methodology

3.1. Sampling

The research population is including all undergraduate students registered in Saudi Arabia universities. According to Statista, nearly 1,000,000 university students were enrolled in 20 different institutions in 2020. This research focused on public institutions in KSA that rely largely on the Blackboard platform to provide lectures and connect with students throughout the COVID-19 pandemic.

The study team sent the questionnaire to students via personal networks, i.e., university lecturers, who are working at different public universities in the kingdom. They were requested to share the survey link with their undergraduate students through WhatsApp or email. Students have the option to accept or refuse answering the survey and were informed that their replies were anonymous.

The survey was voluntary, anonymous, and protected the data's anonymity. To ensure anonymity, all personally identifying information about respondents was deleted from the publicly available results. Name, age, and university name were optional. A total of 1400 questionnaires were distributed, with an overall response rate of around 85% (600 male, 600 female).

3.2. Instrument and Questionnaire Development

The research dimension was measured using a multi-item scale (5-point Likert scale). The scale has six dimensions developed by Awidi et al. [27]. There are 26 items on the scale to define the student e-learning experience. This scale postulated that when students engage in six e-learning practices, their experience is enhanced. These practices include: "have access to information and resources"; "have enough support to motivate them"; "participating and collaborating with others"; "have acceptable assessment"; "have appropriate feedback which encourage them to progress their education"; and "have critical reflection and knowledge construction".

The online survey was prepared in accordance with the guidelines outlined in the literature [28]. After creating the instrument, one member of the research group designed the online survey, which was then rigorously reviewed by other team members before sending the URL to students. The study aim was defined, and students were invited to participate. Participants were informed of their privacy and the study's goal. Students received the introduction with the URL (in English and Arabic) via personal emails or social media profiles. The study team verified and followed up the responses in a daily base. Contact information (name, phone number, email address, and social media accounts) was added at the end of the introduction.

After the questionnaire was translated from English to Arabic, 15 students and 15 academics were asked to assess the questions for clarity, simplicity, and appropriateness. During this procedure, no major changes were made, although a few suggestions for lan-

guage clarity were incorporated. Cronbach's alpha (α) values were utilized to assess the scale items' reliability. These values ranged from 0.92 to 0.96, above the 0.7 cut-off value recommended by Nunnally [29].

Because the data was gathered using a self-reporting questionnaire, several processes were implemented in order to address and investigate the possibility of common method variation in the data (CMV) [30]. For example, respondents' identities and confidentiality were protected. Moreover, Harman's single-factor method was used, and all indicators were analyzed using SPSS software for exploratory factor analysis (EFA), with a maximum of one factor retrieved without rotation. The results revealed that CMV was not an issue in our study since just one variable explained 41% of the variance [31].

3.3. Techniques for Data Analysis

There were three types of data analysis used in this study: preliminary analysis (missing data and normality testing), descriptive analysis (means values, standard deviation, and respondent characteristics,), and multivariate data analysis: "confirmatory factor analysis" (CFA) and "structural equation modelling" (SEM). SEM was chosen as the major data analysis method because it can simultaneously investigate and evaluate complicated interrelationships between latent/unobserved multidimensional components. SEM may also be used to examine relationships between variables while accounting for measurement error [32]. To find SEM goodness of fit (GOF), cut-off points were as follows: "2/df, SRMR, RMSEA, CFI, NFI, TLI, PCFI, and PNFI", as numerous academics have advocated [33–35]. Throughout the data analysis process, SPSS version 25 and AMOS version 18 software were employed.

4. Results

4.1. Preliminary and Descriptive Analysis

To deal with missing data, SPSS version 25 identified the lowest and highest values. A few missing data points were detected (less than five percent). Because of this, the issue of missing data was not a problem, and any solution would yield similar results Kline, 2015. The readings for skewness and kurtosis (score distribution) revealed that there were no values larger than -2 or $+2$, suggesting a normal univariate normality [36].

In terms of demographics, male (50%) and female (50%) students were equally represented in this study. The majority of undergraduate students, as could be assumed, were under the age of 25 (90 percent).

In their responses, the participants gave a number between 1 and 5, with 5 indicating "strongly agree" and 1 indicating "strongly disagree." As shown in Table 1, the mean values ranged from 3.58 to 4.05, while the standard deviation values ranged from 0.813 to 1.181. As a result, the data were more disseminated and less concentrated around the center [37].

Table 1. Measures of the study constructs.

Latent Variables	Observed Variables	Model 1 (Male)					Model 2 (Female)				
		FL	CR	α	AVE	MSV	FL	CR	α	AVE	MSV
Feedback [27]	F_1: "I was given adequate feedback about how well I was doing in the studied courses."	0.88					0.97				
	F_2: "I have been provided with feedback in the studied courses."	0.93	0.95	0.95	0.83	0.40	0.96	0.97	0.97	0.91	0.58
	F_3: "The feedback on my work gave me direction on how I needed to improve."	0.93					0.92				
	F_4: "I used the feedback to improve on the quality of my assignments."	0.88					0.96				
Support and motivation [27]	Supp_1: "I am more interested in the studied courses now than when I first started the course."	0.89					0.97				
	Supp_2: "The course structure support my ability to successfully achieve the course outcome."	0.92	0.96	0.95	0.85	0.17	0.91	0.97	0.97	0.89	0.42
	Supp_3: "The course coordinator was responsive to my learning needs of the course."	0.96					0.90				
	Supp_4: "I did feel supported to conduct my own learning through research."	0.91					0.98				

Table 1. *Cont.*

Latent Variables	Observed Variables	Model 1 (Male)					Model 2 (Female)				
		FL	CR	α	AVE	MSV	FL	CR	α	AVE	MSV
Access to information and resources [27]	Inf_1: "I did find the course readings interesting."	0.94					0.95				
	Inf_2: "The online readings really supported my learning."	0.94	0.96	0.96	0.86	0.40	0.96	0.97	0.97	0.89	0.58
	Inf_3: "I had access to adequate learning resources relevant for the course."	0.94					0.97				
	Inf_4: "I was provided with sufficient information to get on with my studies."	0.87					0.88				
Participation and collaboration [27]	Parc_1: "I did find the online working together activities of the course interesting."	0.95					0.88				
	Parc_2: "I felt encouraged by the learning activities provided."	0.95	0.97	0.96	0.89	0.22	0.96	0.96	0.96	0.87	0.42
	Parc_3: "I did feel encouraged to learn by engaging in the group activities."	0.96					0.94				
	Parc_4: "I feel a greater sense of community with my class peers."	0.90					0.94				
Assessment [27]	Asses_1: "The online assignments have enhanced my ability to judge my own work."	0.85					0.93				
	Asses_2: "Assessment in this course improved my learning of the subject."	0.91	0.93	0.93	0.73	0.16	0.96	0.95	0.95	0.81	0.45
	Asses_3: "Assessment items were used to improve my learning in this course."	0.82					0.83				
	Asses_4: "The assessment criteria were clearly communicated to me."	0.85					0.93				
	Asses_5: "Preparing for the assessment activities did help my learning of the course goals."	0.84					0.82				
Critical reflection and knowledge construction [27]	Ref_1: "I feel more confident in articulating and presenting design ideas."	0.84					0.90				
	Ref_2: "I am learning to creatively interpret the legacy of the past through the online design activities."	0.85	0.92	0.92	0.69	0.21	0.85	0.93	0.93	0.73	0.39
	Ref_3: "I am gaining insight into how the studied courses engaged with cultural, political and social issues."	0.84					0.88				
	Ref_4: "I felt confident to explore more content of interest of the course."	0.81					0.81				
	Ref_5: "I felt confident in using knowledge acquired from the course to solve problems."	0.82					0.84				

Model 1 Male: "$\chi 2$ (284, N = 600) = 1001.384, $p < 0.001$, normed $\chi 2$ = 3.526, RMSEA = 0.049, SRMR = 0.0395, CFI = 0.950, TLI = 0.952, NFI = 0.940, PCFI = 0.735 and PNFI = 0.712."

Model 2 Female: "$\chi 2$ (284, N = 600) = 850.864, $p < 0.001$, normed $\chi 2$ = 2.996, RMSEA = 0.029, SRMR = 0.0251, CFI = 0.951, TLI = 0.956, NFI = 0.950, PCFI = 0.717 and PNFI = 0.792."

Note: FL = factor loading; CR = composite reliability; α = Cronbach's alpha; AVE = average variance extracted; MSV = maximum shared variance.

4.2. Quantitative Study

We employed a two-stage structural equation modeling (SEM) technique [38], employing AMOS 18 and the maximum likelihood estimation procedure, to assess the first-order model (measurement) validity and reliability in Stage 1, and the nomological model (structural) in Stage 2. Additionally, the multi-group testing method was employed in AMOS vs. 18 to assess if the type of gender (male, female) impacted the hypothesized relationship.

4.3. Stage 1: First-Order Models for Construct Validity and Reliability

To assess the validity and reliability of the employed scale in the two sets of data (male and female), first-order confirmatory factor analysis (CFA) models were constructed to represent the correlations between the six dimensions: access to information and resources; support and motivation; participation and collaboration; assessment; feedback; and critical refection and knowledge construction. The first CFA concerns male students (see Table 1), whereas the second draws the same correlations but for female students (see Table 1). As seen in the table, both models match the data well. The composite reliability values for the six factors (Table 1) suggested excellent internal consistency, since they varied from 0.81 to

0.97 and were, therefore, all more than the proposed cut-off value of 0.70 [29]. Additionally, reliability was demonstrated by Cronbach's alpha value (see Table 1), which was greater than the specified cut-off point. Furthermore, the findings in Table 1 demonstrate that the scales had convergent validity, since all loadings were appropriately high and significant, and the average variance extracted (AVE) for all factors exceeded 0.50, as advised by Hair et al. (2014). Furthermore, Table 1 reveals that all maximum shared variance (MSV) values were lower than the corresponding AVE values, demonstrating high discriminant validity of the employed factors [33].

4.4. Stage 2: The Structural Models

Based on the literature research, a specific theoretical model was developed, and the empirical data was collected and analyzed to determine if it matched the model [32]. The proposed model was either rejected or approved depending on model fit criteria.

Table 2 shows the goodness-of-fit indices for the male and female structural models (see Figure 2 and Table 2). The chi-square goodness-of-fit test was significant. ($p < 0.01$) in the two models, indicating that the null assumption (model fits the data well) was not supported. That is, the actual covariance matrix (S) did not match the calculated covariance matrix ($\sum k$). However, because the sample size affects the p value and it is always significant, other GOF were employed such as a "normed chi-square" (chi-square divided by degree of freedom), "Tucker–Lewis index" (TLI), "Comparative Fit Index" (CFI), "Standardized Root Mean Squared" (SRMR), "Root Mean-Square Error Approximation" (RMSEA), and "Parsimony Comparative Fit" (PNFI) [33,35]. Model 2 exhibited somewhat better goodness-of-fit indices than Model 1 (Table 2). Overall, both models matched the data well.

4.5. Multi-Group Analysis

To determine if the students' gender (male, N = 600, female, N = 600) in the two groups were comparable, in order to identify if any deviations in the model routes (i.e., variant) had an effect on the previously postulated relationships, the multi-group analysis approach was used in SEM with Amos version 18 graphics. A $\chi 2$ difference test gives a useful understanding about the variance among the full structural model of the two studied groups (male vs. female students). The baseline (unconstrained) configuration model's $\chi 2$ score was compared to the constrained structural weights model's $\chi 2$ score, indicating a significant difference of 0.001 between the two analyzed groups. As a result, the results indicate that one (or more) of the regressions between the two tested groups was not equal [35].

Table 2. β values and Explanatory power for the two models (Male & Female).

	Hypotheses	Model 1: Male			Model 2: Female		
		β	SMC	Hypotheses Results	β	SMC	Hypotheses Results
H1	Access to information and resources → E-learning experience	0.36 ***	-	Supported	0.42 ***	-	Supported
H2	Support & motivation → E-learning experience	0.27 ***	-	Supported	0.38 ***	-	Supported
H3	Participation and collaboration → E-learning experience	0.31 ***	-	Supported	0.41 ***	-	Supported
H4	Assessment → E-learning experience	0.29 ***	-	Supported	0.39 ***	-	Supported
H5	Feedback → E-learning experience	0.25 ***	-	Supported	0.33 ***	-	Supported
H6	Critical refection and knowledge construction → E-learning experience	0.34 ***	-	Supported	0.43 ***	-	Supported
	E-learning experience	**-**	**0.58**	**-**	**-**	**0.85**	**-**

Model 1 Male: "$\chi 2$ (299, N = 600) = 1293.175, $p < 0.001$, normed $\chi 2$ = 4.325, RMSEA = 0.044, SRMR = 0.0490, CFI = 0.927, TLI = 0.920, NFI = 0.918, PCFI = 0.669 and PNFI = 0.660."

Model 2 Female: "$\chi 2$ (299, N = 600) = 1174.173, $p < 0.001$, normed $\chi 2$ = 3.927, RMSEA = 0.0391, SRMR = 0.0331, CFI = 0.950, TLI = 0.946, NFI = 0.951, PCFI = 0.699 and PNFI = 0.692."
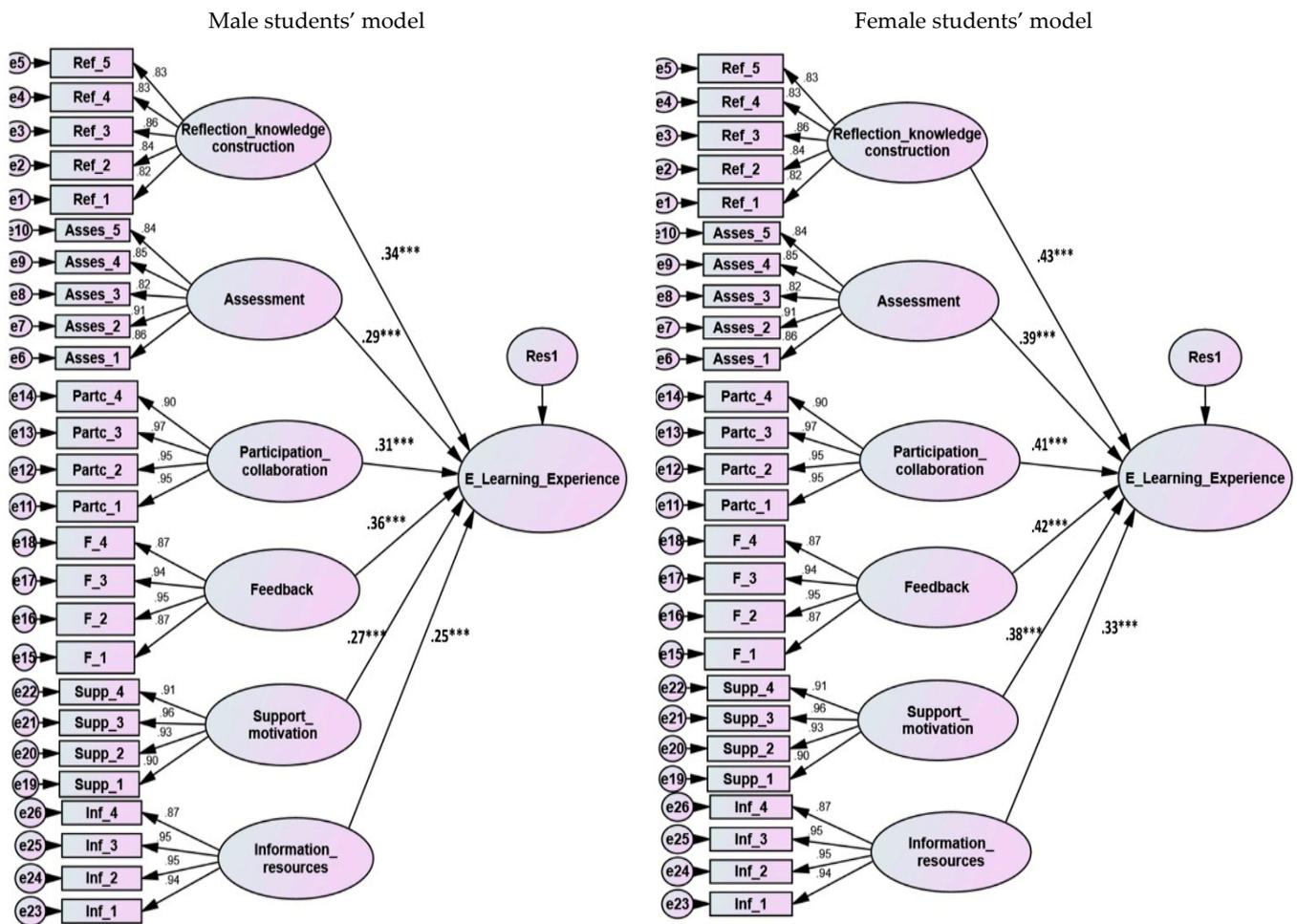
Note: *** $p < 0.001$.

Figure 2. The two structural models for male and female students. *** *p* < 0.001.

As shown in Figure 2 and Table 2, all the hypotheses in the two models were supported. However, the Amos output showed that the Model 2 path coefficients and significant values were higher than the same path coefficients in Model 1. Access to information and resources in Model 2 (female student model) was demonstrated to have a greater, more significant and positive effect (β = 0.42, *p* < 0.001) on e-learning experience (H1) than in Model 1 (β = 0.36, *p* < 0.001). Likewise, support and motivation had a greater significant and positive influence (β = 0.38, *p* < 0.001) on e-learning experience (H2) in Model 2 than was the case in Model 1 (β = 0.27, *p* < 0.001).

The path from students' participation and collaboration to e-learning experience (H3) in Model 2 (β = 0.41, *p* < 0.001) was higher than that in Model 1 (β = 0.31, *p* < 0.001). Similarly, students' assessment had a higher and more significant positive influence (β = 0 0.39, *p* < 0.001) on e-learning experience (H4) in Model 2 than was the case in Model 1 (β = 0.29, *p* < 0.001).

The findings of the path evaluation from students' feedback to e-learning experience (H5) in Model 2 (β = 0.33, *p* < 0.001) were much greater than those for Model 1(β = 0.25, *p* < 0.001). Finally, critical refection and knowledge construction had a greater positive and statistically significant effect (β = 0.43, *p* < 0.001) on e-learning experience (H3b) in Model 2 than in Model 1 (β = 0.34, *p* < 0.001).

Table 2 also shows that the explanatory power of Model 1 regarding the e-learning experience (0.58) was lower than that of Model 2 (0.85). Thus, Model 2 (female student model) showed a higher explanatory power to explain e-Learning experience.

5. Discussion

This research examined the differences between male and female students in their e-learning experiences in higher education amid COVID-19, especially in gender-segregated cultures, i.e., Saudi Arabia. The results of the structural model and multi-group analysis supported all the research hypotheses. More specifically, the results showed that the path coefficients and significant values were higher among female students than among male students in relationships between the five dimensions on one hand: access to information and resources, support and motivation, participation and collaboration, assessment, feedback, critical reflection, knowledge construction; and e-learning experience on the other hand. Additionally, the explanatory power of the male structural model regarding the e-learning experience (0.58) was lower than that of the structural model of female students (0.85), reflecting a higher explanatory power to explain the e-learning experience. These results support the work of Anwar et al. [8], who found that female medical students have a more positive experience with e-learning than their male counterparts. The results disagree with the findings of Thapa et al. [9], who found no significant differences in students' experiences with e-learning in COVID-19 based on their gender.

However, previous research [8,9] showed contradictory results about the differences between students based on their gender in their e-learning experiences. None of these studies justified these differences or the results they found in general. The current research confirms that the reason for these significant differences is the influence of gender-segregated culture. Female students in such cultures often do not have access to conventional education with face-to-face interaction prior to COVID-19 in all classes, i.e., with a male tutor. Hence, they have accumulated more experience with e-learning than male students [18]. Female students are often more familiar with technology-based learning than male students before COVID-19 [16]. This research showed that female students found that e-learning helped them access more information and resources than their male counterparts. They also found that they had received proper support, felt motivated, participated and collaborated more actively in the course activities, and received appropriate feedback and assessment on their e-courses than their male colleagues. Female students also felt more confident than their male colleagues in using their acquired knowledge to solve problems and engage in further activities. Thus, female students have had better e-learning experiences compared to their male colleagues.

The above results have numerous theoretical and practical implications. With regard to theoretical implications, this research contributed to the general body of academic literature review in relation to the understanding and creation of e-learning experiences for different types of gender. The research showed that gender significantly affects the relationship between several antecedences (access to information and resources, support and motivation, participation and collaboration, assessment, feedback, critical reflection and knowledge construction) and the e-learning experience of higher education students. The research explains why these differences exist. Gender segregation was the major factor that was behind these results. When female students are segregated, they become familiar with e-learning; hence, they find it a more positive experience than their male colleagues within the same courses under COVID-19. Additionally, the results of this research confirm that students are not a homogenous group; hence, the results of the previous literature review on students' perceptions and experiences of e-learning amid COVID-19 cannot be simply generalized to all HEI or to all students. For instance, one study [8] showed differences between students in their e-learning experiences, while another study [9] showed no differences, even within the same country. It is crucial to understand the characteristics of HEI and also their students before making any generalization of the research findings. While some HEIs may have adequate ICT infrastructure and technical support, others, even within the same country, do not. Hence, undoubtedly, their students will have different attitudes and experiences towards learning. The results also have some implications for policymakers and educators in HEI. Both policymakers and educators in HEI should pay higher attention to the heterogeneity of students, especially within a

gender-segregated culture. According to current research, female students have a better e-learning experience than male students. They should create a positive and unique e-learning experience for all students, regardless of their gender. Policymakers could consider a mix of conventional learning and e-learning post COVID-19 to harvest the advantages of these learning approaches [39,40].

6. Limitations and Opportunities for Further Research

The study's limitations are expected to be resolved in further research. This study tested six factors as potential antecedents of the students' e-learning experience. However, several other factors such as e-learning infrastructure, students' readiness, family support, learning culture, system design, and change resistance may also impact e-learning experience; nonetheless, they are not included in the study. The authors are encouraged to broaden the scope of this research in the future by examining a broader variety of factors impacting the e-learning experience, and further studies may also implement different research methodology (i.e., qualitative research) to validate and confirm the current study results.

Additionally, further study might be undertaken to examine not just the antecedents of the e-learning experience, but also its outcomes, such as student satisfaction and performance. Furthermore, because the data are cross-sectional, specific causal relationships between variables cannot be determined. Additionally, while we made an effort to avoid CMV in accordance with [41] suggestions, future scholars may use longitudinal data or a combination of data sources to support the study's proposed model. Finally, by employing a multi-group analysis method, the proposed model may be tested and compare the results in different countries [42].

Author Contributions: Conceptualization, M.A.A., I.A.E., F.A., O.H.M.H. and A.E.E.S.; methodology, M.A.A., I.A.E., F.A., O.H.M.H. and A.E.E.S.; software, I.A.E.; validation, A.E.E.S. and I.A.E.; formal analysis, M.A.A., I.A.E. and A.E.E.S.; investigation, M.A.A., A.E.E.S. and I.A.E.; resources, I.A.E. and A.E.E.S.; data curation, A.E.E.S., and I.A.E.; writing—original draft preparation, M.A.A., F.A., O.H.M.H., I.A.E. and A.E.E.S.; writing—review and editing, A.E.E.S. and I.A.E.; visualization, I.A.E.; supervision, A.E.E.S.; project administration, A.E.E.S. and I.A.E. and M.A.A.; funding acquisition, M.A.A., I.A.E., F.A., O.H.M.H. and A.E.E.S. All authors have read and agreed to the published version of the manuscript.

References

1. Ray, S.; Srivastava, S. Virtualization of science education: A lesson from the COVID-19 pandemic. *J. Proteins Proteom.* **2020**, *11*, 77–80. [CrossRef] [PubMed]
2. Sobaih, A.E.E.; Salem, A.E.; Hasanein, A.M.; Elnasr, A.E.A. Responses to Covid-19 in higher education: Students' learning experience using microsoft teams versus social network sites. *Sustainability* **2021**, *13*, 10036. [CrossRef]
3. Bradford, P.; Porciello, M.; Balkon, N.; Backus, D. The Blackboard learning system: The be all and end all in educational instruction? *J. Educ. Technol. Syst.* **2007**, *35*, 301–314. [CrossRef]
4. Sobaih, A.; Hasanein, A.; Abu Elnasr, A. Responses to COVID-19 in Higher Education: Social Media Usage for Sustaining Formal Academic Communication in Developing Countries. *Sustainability* **2020**, *12*, 6520. [CrossRef]
5. Jacques, S.; Ouahabi, A.; Lequeu, T. Remote Knowledge Acquisition and Assessment During the COVID-19 Pandemic. *Int. J. Eng. Pedagog.* **2020**, *10*, 120–138. [CrossRef]

6. Mishra, L.; Gupta, T.; Shree, A. Online teaching learning in higher education during lockdown period of COVID-19 pandemic. *Int. J. Educ. Res.* **2020**, *1*, 100012. [CrossRef]
7. Rashid, S.; Yadav, S. Impact of COVID-19 pandemic on higher education and research. *Indian J. Hum. Dev.* **2020**, *14*, 340–343. [CrossRef]
8. Anwar, A.; Mansoor, H.; Faisal, D.; Khan, H.S. E-Learning amid the COVID-19 Lockdown: Standpoint of Medical and Dental Undergraduates. *Pak. J. Med. Sci.* **2021**, *37*, 217. [CrossRef]
9. Thapa, P.; Bhandari, S.L.; Pathak, S. Nursing students' attitude on the practice of e-learning: A cross-sectional survey amid COVID-19 in Nepal. *PLoS ONE* **2021**, *16*, e0253651. [CrossRef]
10. Toquero, C.M. Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. *Pedagog. Res.* **2020**, *5*, 4. [CrossRef]
11. Adnan, M.; Anwar, K. Online Learning amid the COVID-19 Pandemic: Students' Perspectives. *Online Submiss.* **2020**, *2*, 45–51. [CrossRef]
12. Al-Balas, M.; Al-Balas, H.I.; Jaber, H.M.; Obeidat, K.; Al-Balas, H.; Aborajooh, E.A.; Al-Taher, R.; Al-Balas, B. Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: Current situation, challenges, and perspectives. *BMC Med. Educ.* **2020**, *20*, 341.
13. Agustina, P.Z.R.; Cheng, T.H. How Students' Perspectives about Online Learning Amid the COVID-19 Pandemic? *Stud. Learn. Teach.* **2020**, *1*, 133–139.
14. Kaur, N.; Dwivedi, D.; Arora, J.; Gandhi, A. Study of the effectiveness of e-learning to conventional teaching in medical undergraduates amid COVID-19 pandemic. *Natl. J. Physiol. Pharm. Pharmacol.* **2020**, *10*, 563–567. [CrossRef]
15. Masters, K.; Ellaway, R. e-Learning in medical education guide 32 part 2: Technology, management and design. *Med. Teach.* **2008**, *30*, 474–489. [CrossRef]
16. Alhazmi, A.; Nyland, B. Contextualization of Saudi international students' experience in facing the challenge of moving to mixed gender environments. *Am. Int. J. Contemp.* **2015**, *5*, 87–97.
17. AlMunajjed, M. *Women in Saudi Arabia Today*; Palgrave-Macmillan: London, UK, 1997.
18. Baki, R. Gender-segregated education in Saudi Arabia: Its impact on social norms and the Saudi Labor market. *Educ. Policy Anal. Arch.* **2004**, *12*, 28. [CrossRef]
19. Unified National Platform. Women Empowerment. Available online: https://www.my.gov.sa/wps/portal/snp/careaboutyou/womenempowering (accessed on 7 January 2022).
20. Achoui, M.M. The Saudi society: Tradition and change. In *Families across Cultures: A 30-Nation Psychological Study*; Georgas, J., Berry, J.W., van de Vijver, F.J.R., Kagitcibasi, C., Poortinga, Y.H., Eds.; Cambridge University Press: Cambridge, UK, 2006; pp. 435–441.
21. Alhazmi, A.; Nyland, B. The Saudi Arabian international student experience: From a gender-segregated society to studying in a mixed-gender environment. *Comp. A J. Comp. Int. Educ.* **2013**, *43*, 346–365. [CrossRef]
22. Elci, A. A Metadata Model for E-Learning Coordination through Semantic Web Languages. *Turk. Online J. Educ. Technol.* **2005**, *4*, 12–17.
23. Al Lily, A.E. On line and under veil: Technology-facilitated communication and Saudi female experience within academia. *Technol. Soc.* **2011**, *33*, 119–127. [CrossRef]
24. Alhareth, Y. An Investigation into the Contribution of E-Learning to the Improvement of Higher Education Opportunities for Women in Saudi Arabia. Ph.D. Thesis, De Montfort University, Leicester, UK, 2014. Available online: https://dora.dmu.ac.uk/handle/2086/12430 (accessed on 7 January 2022).
25. Prakash, L.S.; Saini, D.K. E-assessment for e-learning. In Proceedings of the 2012 IEEE International Conference on Engineering Education: Innovative Practices and Future Trends (AICERA), Kottayam, India, 19–21 July 2012; IEEE: Piscataway, NJ, USA, 2012; pp. 1–6.
26. Nalini, G.K.; Deepak, P.; Neelamma, P.; Sahana, G.N.; Nagaral, J.V. Effectiveness of digital learning versus traditional learning among undergraduate students-prescription writing. *Natl. J. Physiol. Pharm. Pharm.* **2020**, *10*, 9–14.
27. Awidi, I.T.; Paynter, M.; Vujosevic, T. Facebook group in the learning design of a higher education course: An analysis of factors influencing positive learning experience for students. *Comput. Educ.* **2019**, *129*, 106–121. [CrossRef]
28. Evans, J.; Mathur, A. The value of online surveys. *Internet Res.* **2005**, *15*, 196–219. [CrossRef]
29. Nunnally, J.C. *Psychometric Theory 3E*; Tata McGraw-Hill Education: New York, NY, USA, 1994.
30. Lindell, M.K.; Whitney, D.J. Accounting for common method variance in cross-sectional research designs. *J. Appl. Psychol.* **2001**, *86*, 114. [CrossRef] [PubMed]
31. Podsakoff, P.M.; MacKenzie, S.B.; Podsakoff, N.P. Sources of Method Bias in Social Science Research and Recommendations on How to Control It. *Annu. Rev. Psychol.* **2012**, *63*, 539–569. [CrossRef] [PubMed]
32. Schumacker, R.E.; Lomax, R.G. *A Beginner's Guide to Structural Equation Modeling*, 3rd ed.; Taylor & Francis Group: New York, NY, USA, 2010.
33. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis: Pearson New International Edition*; Pearson Education Limited: Essex, UK, 2014.
34. Kline, R.B. *Principles and Practice of Structural Equation Modeling*; Guilford Publications: New York, NY, USA, 2015.

35. Byrne, B.M. *Structural Equation Modeling with Mplus: Basic Concepts, Applications, and Programming*; Routledge: New York, NY, USA, 2013.
36. Tabachnick, B.; Fidell, L. *Using Multivariate Statistics*, 5th ed.; Pearson: New York, NY, USA, 2007.
37. Bryman, A.; Cramer, D. *Quantitative Data Analysis with IBM SPSS 17, 18 & 19: A Guide for Social Scientists*; Routledge: New York, NY, USA, 2012.
38. Anderson, J.C.; Gerbing, D.W. Structural equation modeling in practice: A review and recommended two-step approach. *Psychol. Bull.* **1988**, *103*, 411. [CrossRef]
39. Garrison, D.R.; Kanuka, H. Blended learning: Uncovering its transformative potential in higher education. *Internet High. Educ.* **2004**, *7*, 95–105. [CrossRef]
40. Garrison, D.R.; Vaughan, N.D. *Blended Learning in Higher Education: Framework, Principles, and Guidelines*; John Wiley & Sons: Hoboken, NJ, USA, 2008.
41. Podsakoff, N.P.; LePine, J.A.; LePine, M.A. Differential Challenge Stressor-Hindrance Stressor Relationships with Job Attitudes, Turnover Intentions, Turnover, and Withdrawal Behaviour: A Meta-Analysis. *J. Appl. Psychol.* **2007**, *92*, 438. [CrossRef]
42. Elshaer, I.A.; Augustyn, M.M. Testing the Dimensionality of the Quality Management Construct. *Total Qual. Manag. Bus. Excell.* **2016**, *27*, 353–367. [CrossRef]