International Students' Satisfaction with Online Learning during the COVID-19 at a South Korean University

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Abstract. Previous research has emphasised the importance of online learning during COVID-19 for local students. However, previous research has not fully explored how international students in higher education perceive online learning. To fill the gap in the literature, this research specifically focuses on international students' satisfaction level with online learning during COVID-19 at a South Korean university. In the present study, international student satisfaction with online learning was assessed utilising a research instrument previously employed by Almusharraf and Khahro (2020). A total of 44 undergraduate and 215 graduate students participated in the survey via convenience sampling, and structural equation modeling was used to analyse the data. The study results indicated that gender played a significant role in satisfaction with online learning, that previous online learning experience did not predict satisfaction, that undergraduate and graduate students were satisfied with online learning, but that only graduate students perceived school support as important. In addition, the results showed that international students were satisfied with their online learning regarding instructors' online teaching methods and school support. Finally, the implications of providing effective online education for international students are discussed.

Keywords: COVID-19; higher education; international students; online learning; satisfaction levels; synchronous and asynchronous online learning

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1. Introduction

COVID-19 has caused many higher education institutions worldwide to alter the face-to-face (F2F) course design setting. Mandates enforced by local governments and institutions of higher learning require faculty to conduct online education, regardless of students' and teachers' level of expertise in technological competencies and preparedness (Adnan & Anwar, 2020; Chung & Dass, 2020). Although online instruction is a well-accepted pedagogical method, teachers and instructors still lack competency in implementing online learning platforms from K-12 to university levels (Sintema, 2020). Considering this circumstance, it is essential to understand students' satisfaction levels with the online learning process (Tang et al., 2021).

Recent studies have identified critical challenges that affect students' online learning experience due to the pandemic. These challenges include low-quality online instructional delivery, lack of professional training, and technical issues (Gonzalez et al., 2020; Gopal et al., 2021). Other reported issues were the adaptability skills of instructors to customise their lectures for online learning, monitor students' progress, and failure to design authentic online assessments (Baber, 2021; Jeong, 2019).

It has been suggested that students' online learning satisfaction is heavily influenced by effective online teaching and learning strategies (Kwon et al., 2010; Lee et al., 2021). Within this setting, learners are required to engage in using specific online platforms independently or collaboratively. Although many studies have explored local students' online learning satisfaction (Gocotano et al., 2021; Rachman, 2022), previous research has failed to explore diverse student populations in higher education, especially international students during COVID-19 (Demuyakor, 2020; Komolafe et al., 2020; Novikov, 2020; Stewart & Lowenthal, 2021).

To fill the gap in the existing literature, this research explores international students' satisfaction levels with online learning experiences at a South Korean university during the pandemic. This research aims to answer the following question based on the literature review:
Research question: To what extent are international students at a Korean university satisfied with online teaching and learning approaches utilised during COVID-19?

2. Literature Review
2.1. University students' online learning during COVID-19
Recent studies have indicated that different factors can impact university students' online learning experiences when courses are transitioned from face-to-face to online because the online format introduces new variables absent in traditional delivery formats (Gocotano et al., 2021). Several factors can make online learning challenging for university students when classes are forced online (Rachman, 2022). This argument is not only an issue for students, but during synchronous sessions educators have also had connectivity problems that disrupt the flow of the class (Chung & Dass, 2020; Muganga et al., 2021; Demuyako, 2020;

Yusuf & Jihan, 2020). Data from Chung and Dass (2020) revealed that over half of the university students surveyed would opt out of online learning if they had a choice because of issues with connectivity and working with the technology.

Other factors influencing learner satisfaction have been the quality of instructors, course design, feedback, and institutional support (Gopal et al., 2021; Maheshwari, 2021; Muthuprasad et al., 2021). For instance, Maheshwari (2021) aimed to understand the factors that impact students' intentions to study online. The results suggested that institutional support and users' enjoyment influenced online learning intentions. The authors also concluded that various aspects, such as flexibility, convenience, and accessibility, played a role in university students' online course satisfaction.

Several studies have reported that COVID-19 could negatively impact university students' online learning experiences. These studies concluded that when the institutions and faculty had not prepared for online teaching, students could show negative online learning experiences. Especially in the early breakout of COVID in 2020, faculty found it challenging to properly prepare their online instruction so that it promoted students' satisfaction with courses (Aguilera-Hermida, 2020; Chung & Dass, 2020; Rahiem, 2020).

2.2. Factors that influence students' online learning experiences
Previous studies have summarised three factors that influence students' online learning experiences: gender differences, prior learning experience, and university students' grade levels (Almusharraf & Khahro, 2020; Chung & Dass, 2020; Shen et al., 2013). González-Gómez et al. (2012) found that female students are more satisfied than male students with online learning. Furthermore, female students assign more importance to the planning of online learning and being able to contact the instructor in various ways. The author argued that these results could indicate that female students are better prepared, organised, participative, and committed to learning. Chung and Dass (2020) also support these results by concluding that female students are more ready for online learning, are more satisfied with it, and have better online learning experiences than male students.

Regarding students' previous online learning experience (Elshami et al., 2021; Hixon et al., 2016; Shen et al., 2013), studies have found that having prior experience with online learning could lead to students' higher satisfaction. For example, Hixon et al. (2016) suggested that students' previous online learning experience could influence their online learning satisfaction and lead to higher expectations of clearly defined online course objectives. Conversely, students with no prior online experience showed lower online learning expectations. Thus, effectively constructed online courses could increase students' satisfaction more than those without previous online learning experiences. In addition, Shen et al. (2013) suggest that students' prior online learning experiences could significantly predict online learning self-efficacy. Specifically, students who participated in more online classes in the past were more likely to communicate and collaborate effectively in an online space with other students on academic tasks than students who had previously taken fewer online courses. Ashong and Commander (2012)

argued that the positive perceptions of students' online learning experience could be linked to the students' higher levels of success in previous online courses. This finding could also show that students' positive experiences in their previous online courses could have led them to enroll in subsequent online courses and contributed to their positive perceptions.

Regarding the students' grade levels in the online learning experience, Fedynich et al. (2015) indicated that graduate students are generally more satisfied with online courses. Specifically, graduate students mentioned the importance of the instructor's role because it affected their online learning satisfaction. It was found that the instructor was responsible for facilitating graduate students' desire to learn and providing clear instruction opportunities to interact with other classmates. In another study, Chen et al. (2021) aimed to understand the university students' experience with technology in distance learning. The results showed changes in online learning satisfaction scores across grade levels as students progressed each year. This satisfaction trend is due to maturity and the number of years of study, further supported by graduate learners' higher online learning satisfaction scores.

2.3. International students' online learning experiences during COVID-19
Recent studies have focused on international students' online learning during COVID-19 (Demuyakor, 2020; Komolafe et al., 2020; Novikov, 2020; Stewart & Lowenthal, 2021). Some of the challenges were summarised as 1) ineffective communication in an online learning space, 2) a distraction and lack of motivation for online learning, and 3) feelings of isolation and loneliness. For instance, Komolafe et al. (2020), who examined international students engaging in online classes during COVID-19, showed showed that communication during online teaching was less effective than in-class teaching. Similarly, online teaching was perceived to be less effective than in-class teaching due to the lack of an element of social interaction. In another study, Stewart and Lowenthal (2021) examined 15 international students forced to participate in distance education courses during COVID-19. Study findings showed that university students' negative online learning experiences, such as isolation and loneliness, emerged from qualitative findings. In conclusion, recent studies during the pandemic reported that international students in higher education could be vulnerable when given online education (Demuyakor, 2020; Komolafe et al., 2020; Novikov, 2020; Stewart & Lowenthal, 2021).

3. Research Method
3.1. Research Context
The current study was conducted at a private university located in the southwest region of South Korea. Owing to COVID-19, the university mandated using online synchronous classes via Zoom during the designated class times. This study specifically focused on Chinese international students because they are the majority of the international student group in the university. The sample consisted of 80 Chinese undergraduate students and 250 Chinese graduate students, but due to attrition, opting out, and incomplete surveys, 44

undergraduate and 215 graduate students were used. Of the final participants, 103 identified as male and 156 as female.

3.2. Data collection and data analysis
Data were collected during the spring semester of 2021. Informed consent forms were collected before the end-of-semester survey in the middle of June. The survey for the current study measured student satisfaction with online learning and was previously implemented by Almusharraf and Khahro (2020). The survey was translated from English to Chinese. The survey implemented a 5-point Likert scale to measure the responders' satisfaction, with scores ranging from (1) strongly disagree to (5) strongly agree. Study participants were recruited via convenience sampling at the university. The survey was divided into four sections: student demographics, students' satisfaction level with the online learning environment, satisfaction with school support, and perceptions of the most effective online learning methods and platforms.

4. Study results
4.1. Survey results
The demographics results showed that, of the 259 respondents who participated in the survey, 103 (39.8%) were male, and the majority (215) were graduate students (83%). In addition, 103 (39.8%) respondents had online learning experience before, most of whom were between 20 and 40 years old (88.8%).

As latent variables (satisfaction with online learning, and school support) were included in the research model, structural equation modeling was used to test the results. Compared with covariance-based structural equation modeling (CB-SEM), Partial Least Squares Structure equation modeling (PLS-SEM) has a minimal request for sample size and distribution assumptions. This study divided groups and compared group differences, which resulted in some groups having small sample sizes; thus, PLS-SEM was used for this analysis.

Reliability, convergent, and discriminant validity were examined to evaluate the measurement model. Table 1 shows that the measures met all reliability and concurrent validity requirements. Cronbach's alpha and composite reliability assessed reliability. Cronbach's alpha values and composite reliabilities (CR) of the two constructs were between 0.924 and 0.976, surpassing the acceptable threshold of 0.70. Convergent validity was assessed using each construct's average variance extracted (AVE) values. The AVE values of the two constructs were 0.817 and 0.767, exceeding the acceptable threshold of 0.5, which indicated that the constructs explained more than 50% of the variance of their items (Hair et al., 2016). As the online learning method is a single-item construct, Cronbach's alpha, CR , and AVE values were not applicable. Finally, the Fornell and Larcker (1981) criterion and Heterotrait-Monotrait Ratio (HTMT) were examined to assess the discriminant validity. The square roots of a construct's AVE values were higher than its highest correlation with any other construct, which met the Fornell and Larcker criterion (Fornell & Larcker, 1981; Hair et al., 2016). The HTMT values ranged from 0.588 to 0.855, below the threshold of 0.90 (Henseler et al. 2015; Hair

et al. 2016). Thus, the discriminate validity was validated for all constructs of the model.

Table 1: Reliability and convergent validity of measurement model

Constructs	Items	Loadings	T statistics	Cronbach's Alpha	CR	AVE
Satisfaction with online learning	SOL1	0.917	49.016	0.972	0.976	0.817
	SOL2	0.843	16.580			
	SOL3	0.924	53.597			
	SOL4	0.913	64.775			
	SOL5	0.898	32.854			
	SOL6	0.915	66.696			
	SOL7	0.877	37.901			
	SOL8	0.914	44.375			
	SOL9	0.931	58.426			
Satisfaction with school support	SSS1	0.874	37.928	0.924	0.943	0.767
	SSS2	0.877	32.074			
	SSS3	0.880	44.702			
	SSS4	0.904	46.235			
	SSS5	0.842	24.165			
Online learning methods	OLM1	1.000	-	-	-	-

- : single item construct

Table 2: Fornell-Larcker Criterion

	Online learning methods	Satisfaction with online learning	Satisfaction with school support
Online learning methods	-		
Satisfaction with online learning	0.587	0.904	
Satisfaction with school support	0.574	0.818	0.876

*Diagonal elements are the square roots of Average Variance Extracted (AVE)
 - : single item construct

Table 3: Heterotrait-Monotrait Ratio (HTMT)

	Online learning methods	Satisfaction with online learning	Satisfaction with school support
Online learning methods			
Satisfaction with online learning	0.589		
Satisfaction with school support	0.588	0.855	

Before assessing the structural model, multicollinearity was examined. However, the variance inflation factor (VIF) value between Satisfaction of online learning and Satisfaction of school support was 3.019, lower than the threshold 10, so multicollinearity was not a critical issue.

First, in a structure model with the full sample (n=259), both satisfaction with online learning and school support positively affected online learning methods. In Table 3, online learning satisfaction was a more effective antecedent to online learning methods (β=0.354, p=0.017), and satisfaction with school support approached significance (β=0.285, p=0.053). The R square of the structure model was 0.372, which suggested both satisfaction with online learning and satisfaction with school support together, explaining 37.2% of the variance for online learning methods in the full sample.


* P < 0.10, ** P < 0.05, *** P < 0.01
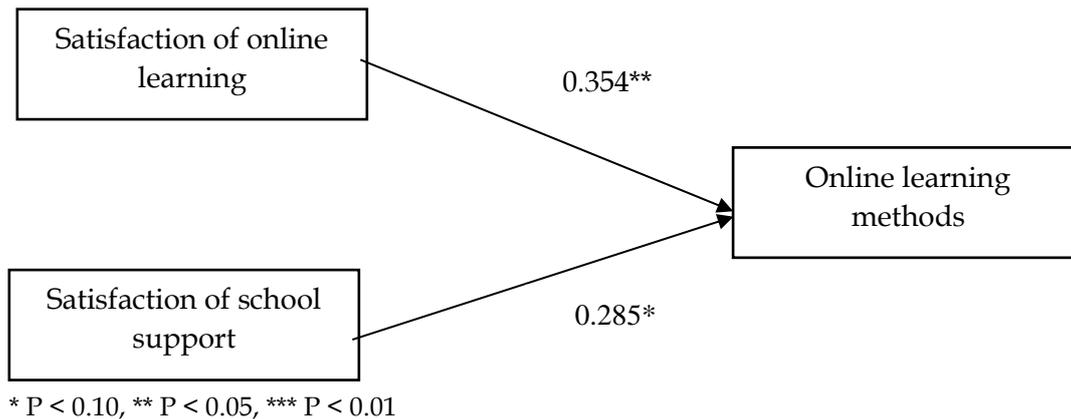
Figure 1: Full sample results

Table 4: Full sample results

Relationships	Path coefficients	T statistics	P Values
Satisfaction of online learning -> Online learning methods	0.354	2.393	0.017
Satisfaction of school support -> Online learning methods	0.285	1.942	0.053

To compare differences between male and female students, a structure model was run with different gender groups. As shown in Figure 1 and Table 4, only male students' satisfaction with school support significantly affected the online learning method (β=0.451, p=0.028). However, for female students, only satisfaction with online learning significantly affected online learning methods (β=0.594, p=0.001). Satisfaction with school support is an important determinant of online learning for male students; however, satisfaction with online learning environments is more important for female students.

A structure model was run with different experience groups to compare students who had a previous online learning experience and those with no online learning experience. The results showed that satisfaction was significant both for students who had online learning experience (β=0.608, p=0.023) and students who did not have online learning experience (β=0.568, p<0.001).

In order to compare differences between undergraduate and graduate students, a structure model was run as separate groups. For undergraduate students, only satisfaction with online learning mattered (β=0.650, p=0.009); however, for graduate students, both satisfaction with online learning (β=0.317, p=0.044) and

school support mattered (β=0.343, p=0.024). School support was not important for undergraduate students in the online learning environment.
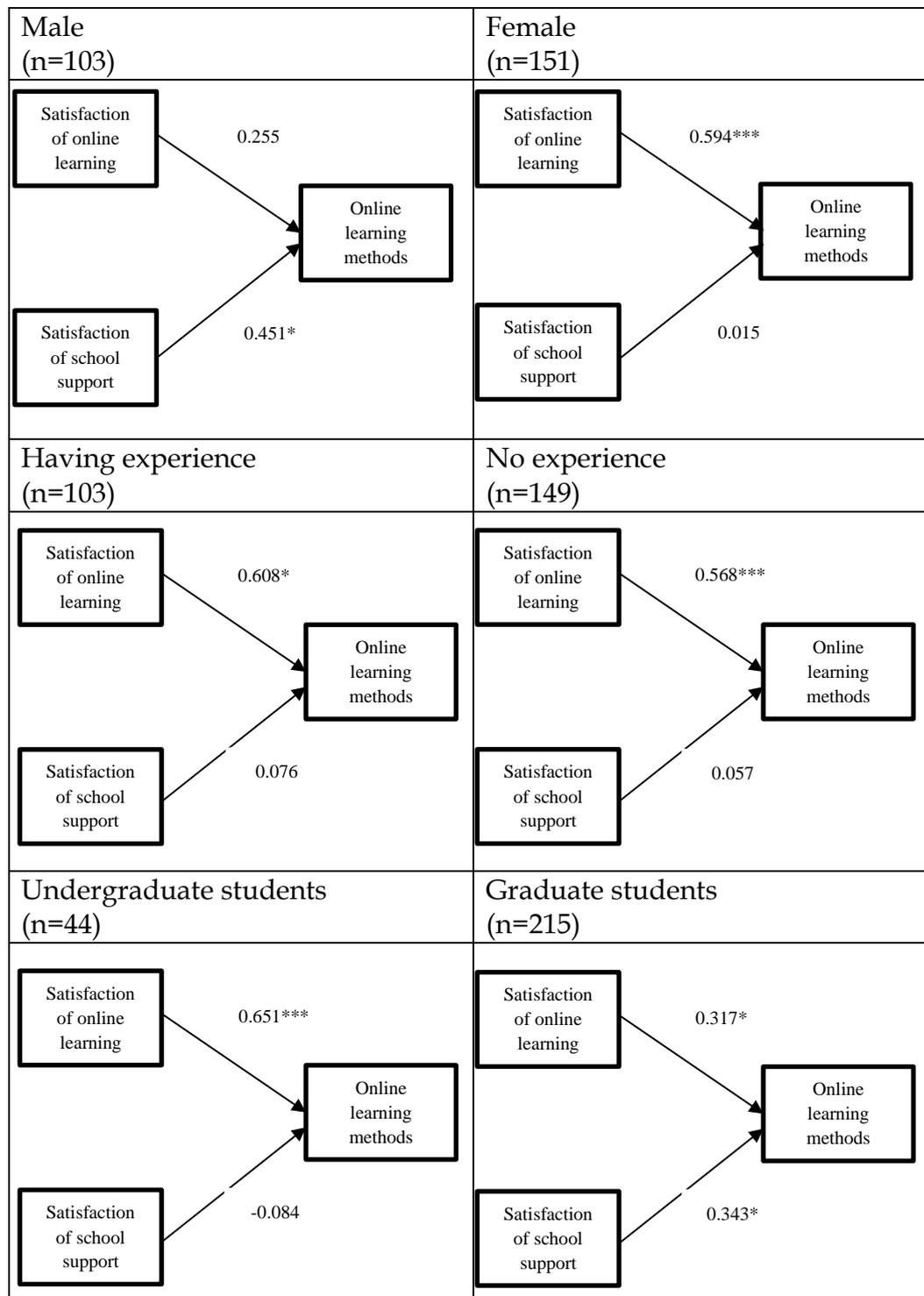
Figure 2: Grouped results

* P < 0.10, ** P < 0.05, *** P < 0.01

Subgroup sample size n is counted after eliminating missing values in the variable of gender and experience.

Table 5: Grouped results

	Male			Female		
	Path coefficients	**T statistics**	**P Values**	**Path coefficients**	**T statistics**	**P Values**
Satisfaction with online learning	0.255	1.181	0.238	0.594	3.474	0.001
Satisfaction with school support	0.451	2.197	0.028	0.015	0.087	0.931
	Having experience			**No experience**		
Satisfaction with online learning	0.608	2.274	0.023	0.568	4.217	0.000
Satisfaction with school support	0.076	0.317	0.751	0.057	0.422	0.673
	Undergraduate students			**Graduate students**		
Satisfaction with online learning	0.651	2.615	0.009	0.317	2.016	0.044
Satisfaction with school support	-0.084	0.324	0.746	0.343	2.259	0.024

5. Discussion

This research explored how online teaching and learning components influenced international university students' satisfaction. Previous research on students in the online environment mostly focused on local students. This research aimed to assess if those previously defined factors for online satisfaction remained consistent with international students. This research used structural equation modeling to explore international students' satisfaction with online learning.

RQ1: To what extent are international students satisfied with online teaching and learning approaches utilised during COVID-19?

5.1. Gender Differences

In relation to gender, males and females scored significantly differently on satisfaction with online learning. Female students were significantly more satisfied with the online learning methods (β=0.594, p=0.001) than males; however, males were significantly more satisfied with the school support for online learning than females. Previous research supports these findings concerning females and online learning methods, that is, that females are typically significantly more satisfied with online learning components than males. For example, a large-scale study by González-Gómez et al. (2012) found that females significantly valued course aspects such as clarity of the content, teaching methods, teaching tools, and teachers more than males. Likewise, Shen et al. (2013) indicated that females more than males significantly valued online learning methods. The authors suggest females "may be more active, seek more help, or function better than male students (p.16)." Unfortunately, neither of the studies evaluated how either gender perceived school support. Still, these findings offer

empirical evidence that interaction and course design is more important for female students than male students.

However, it is not clear why male students were significantly more satisfied with school support. A recent study by Almusharraf and Khahro (2020) indicated that students were satisfied with school support, but the authors did not compare female and male perceptions. Future research needs to examine why males might be more satisfied with the support structures provided for online learning.

Although this research and previous research have found that students are satisfied with online learning, an earlier coronavirus research study by Chung and Dass (2020) supported the heightened satisfaction of females compared to males but found that more than half of the female and male students preferred not to continue online courses if provided a choice. This result suggests that satisfaction cannot be perceived as a continuation within the online context. The concept of satisfaction might be perceived differently when external factors such as online delivery mandates are eased during post-pandemic education.

5.2 Previous Online Learning Experience
The results from this research indicate that students with previous online experience and students without online experience were significantly satisfied with the online learning experience. These results find some support from previous research, but the literature is mixed on how much experience contributes to satisfaction. For example, Elshami et al. (2021) surveyed medical students learning online and discovered no significant differences between students with previous online learning experience and those with no previous online learning experience. However, other research studies have found that having experience with online learning could lead to higher satisfaction. For example, Hixon et al. (2016) suggested that students' prior online learning experience could influence their online learning satisfaction and lead to higher expectations of clearly defined online course objectives. Conversely, students with no prior experience showed little difference in online learning expectations. In other words, effectively constructed online courses had higher satisfaction rates with students with previous online learning experience than those without online experience.

In addition to comparing previous experience against no experience, Shen et al. (2013) suggest that more experience can significantly predict online learning self-efficacy. Students who participated in more online classes were more likely to communicate and collaborate effectively in an online space with other students on academic tasks than those who had previously taken fewer online courses. However, it must be noted that previous counting experience is an objective measure, but the experience can be subjective based on the design and expectations of the course. Further research needs to be conducted to assess experience when factoring in variables such as instructional design and the purpose of the course. The students in this research study had access to pre-distributed class materials via a learning management system (L.M.S.), separate meetings after the synchronised course, and they utilised WeChat to communicate. The significant satisfaction ratings might result from a course

design that properly supported the students with previous experience but mainly provided guidance for those experiencing online learning for the first time. Further research needs to be conducted on course design to understand why previous experience was not a significant factor compared with no experience.

5.3. Undergraduate and Graduate Students

The results indicated that undergraduate and graduate students were satisfied with online learning, but only the graduate students significantly rated school support as important. Previous research to assess the satisfaction of perceived satisfaction between undergraduate and graduate students supports the findings of satisfaction with online learning (Shen et al., 2013; Cole et al., 2014). A three-year study of undergraduate and graduate students by Cole et al. (2014) indicated that satisfaction was increased if the students were conversant with the delivery. Still, dissatisfaction could occur if students did not have the opportunity to communicate with one another. The synchronised design and the use of WeChat might have been contributing factors to the satisfaction experienced by both groups.

However, only graduate students rated school support as significant. Researchers need to analyse further the literature on the interaction between graduate students and school support. For example, Fedynich et al. (2015) indicated that graduate students were satisfied with school support at 63.05% but noted that it was the second lowest evaluation of satisfaction behind opportunities to interact at 61%. Further explanations or discussions regarding the evaluation of school support were not provided. This area within the online learning literature should be addressed as online classes become more prominent in higher education.

6. Conclusions

This research focuses on international students' experience with online learning during COVID-19 at a South Korean university. The study results indicated that gender significantly impacted satisfaction with online learning, but previous online learning experiences did not predict online learning satisfaction. Both undergraduate and graduate students were satisfied with online learning, but only graduate students perceived school support as important. In addition, the results showed that international students were satisfied with their online learning regarding instructors' online teaching methods and school support.

Although the findings of this study are valuable for understanding international students' online learning experiences during COVID-19, the data were provided in a specific context. Therefore, the results from this study could be different in the case of a different institution with a different international student population. Thus, future studies need to look more closely at whether there is a consideration of students' diversity in characteristics of personality, learning abilities, and technology accessibility. These dimensions are critical factors in effectively designing productive online learning environments.

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