

Students' perceived learning and satisfaction with online learning in Japan during the COVID-19 pandemic

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Article Info

Article history:

Received May 25, 2023

Revised Sep 8, 2023

Accepted Oct 18, 2023

Keywords:

COVID-19 pandemic

Interaction

Online learning

Perceived learning

Student satisfaction

ABSTRACT

Moving from physical learning to online learning during the COVID-19 pandemic has opened many avenues to focus research on student perceived learning and satisfaction. This study examines the factors influencing the perceived learning and satisfaction of the students with online learning at university "A" in Japan during the COVID-19 pandemic. Primary data were collected via google form from 255 students in the field of social sciences at the university "A" in Nagoya, Japan using a structured questionnaire. R Studio and SPSS software were used to analyze the data. Internet access, learning platforms, and interaction were found to have a significant impact on perceived learning. Two variables; internet access and interaction have a positive impact on perceived learning, whereas learning platform has a negative significant impact on perceived learning. Policymakers and administrators in the higher education sector worldwide may benefit from these findings while formulation policies and strategies to support students during this pandemic and in a similar situation in the future.

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1. INTRODUCTION

The COVID-19 pandemic brought the greatest on health of the people and economy. Due to this pandemic, borders have closed, countries have been locked down, and humans were socially isolated from society. It was an unprecedented social experience for all humans. The pandemic changed life in every aspect, and it evolved a new field of literature in social sciences [1], [2]. It has interrupted the regular operation of all education sector activities in most countries. Administrators and academics in this sector have decided to shift from physical learning to e-learning during the COVID-19 pandemic to overcome disruptions in the education sector, which created some pros and cons on student satisfaction in online learning.

Moving from physical learning to online learning during the pandemic has opened many avenues to focus research on student satisfaction with this new learning setting. Several researches [2], [3] investigated the effects of the pandemic on higher education. Aristovnik *et al.* [4] examined the impact of the first wave of the COVID-19 pandemic on university students' lives such as hygienic behaviors (e.g., wearing masks, washing hands) and discouraged certain daily practices (e.g., leaving home, shaking hands). Live, interactive online learning is reasonably new, and research lacks for a particular region and or country regarding its educational effects and satisfaction.

The impact of COVID-19 on education was investigated by many scholars in various regions. Particularly, developed countries such as the USA and UK faced many barriers and challenges in implementing online learning during the COVID-19 pandemic [5], [6]. Barrot *et al.* [7] identified the challenges that students faced with an online learning platform and how the pandemic affected online learning environment in Philippines. Curelaru *et al.* [8] identified advantages and disadvantages relating to online learning in Romania. Still, what exactly determines students' satisfaction with their online learning during the COVID-19 pandemic remains unexplored, especially in Japan. In this context, we believe this warrant further investigation. The available research on online education during the COVID-19 pandemic reveals that student satisfaction and perceived learning in online learning are determined by a variety of factors, broadly categorized under course structure, student motivation, internet access, and interaction [7]–[11]. Due to the unexpected spread of COVID-19 in 2020, Japan closed all schools similar to other countries, and authorities started discussing how to continue education without interruptions during the pandemic. When this pandemic was prolonged, schools began distance learning practices to continue the education.

The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) in Japan [12] conducted a few systematic surveys to understand how universities and colleges responded to the COVID-19 pandemic. Survey results revealed that about 97% of universities and technical colleges had either started or discussed starting distance education [13]. In general, during the pandemic in Japan, distance learning has become a common approach in higher education. Lee and Han [14] reported that according to MEXT, the majority of the schools had not started distance education, and more than 25,000 schools were closed temporarily in responding to COVID-19. In contrast, the higher education sector quickly began to deliver online education. In country like Japan is facing frequently unexpected natural disasters. Therefore, knowing the factors influencing online learning satisfaction is an important to design proper course structure to face such unexpected events. Accordingly, the main objective of this study is to identify factors influencing student satisfaction and perceived learning during the COVID-19 pandemic with an online learning experience at University "A" in Japan. Thus, the study answers the following research question using structural equation modeling (SEM): what factors influence students' satisfaction and perceived learning with online learning during the COVID-19 pandemic?

Structural equation modeling is one of the most popular statistical methods combining regression and confirmatory factor analysis across various disciplines in the social sciences. SEM supports researchers to answer interrelated questions by analyzing the associations between the more independent and dependent variables at once. Although most of the scholars have used Smart PLS software for analyzing data under SEM method, this study employed free software called R Studio.

2. LITERATURE REVIEW

2.1. Internet access

The success of the e-learning mode mainly determines by accessibility of internet facility and the availability of devices. A research team at the University of Scotland examined student learning experience during the COVID-19 pandemic and disclosed that internet access significantly affects student performance [15]. The most common challenges students face in e-learning are internet accessibility, devices, learning resources and electricity disruptions in Lebanon [16]. Study by Sarvestani *et al.* [17] revealed that one of the most common issues the students encounter during e-learning was internet connectivity and access. The internet facility significantly affects student satisfaction [11]. The study of Armstrong-Mensah *et al.* [5] revealed that although the authorities of Georgia State University School of Public Health (GSU SPH) have given the access to the school's Wi-Fi hotspots facility, many students could not use the Wi-Fi hotspots facility due to numerous difficulties. Thus, students who could not access internet services had to find alternative means by themselves. The study suggested that it is essential for GSU SPH management to identify feasible way of supporting students to get reliable internet access for continue distance learning in the foreseeable future. Khan [6] identified that proper access to technology is an important factor for online learning among higher education students in the UK. This is in particular important to the university authorities to pay more attention towards the attraction of domestic students from underprivileged backgrounds. The most students who are from such backgrounds have insufficient hardware and software, limited access to internet, and not enough study space. Besides, they shared lodging with other students, or with families, with their children or elderly relatives in a lockdown situation. These are some of the disadvantages that negatively affects online learning platforms among domestic students in the UK.

2.2. Student motivation

Harmon-Jones *et al.* [18] showed that motivation is an internal factor that encourages a person to take action to achieve a goal, while Hsu *et al.* [19] found that the impact of self-determined motivation on learning

outcomes as positive. Eom and Ashill [9] revealed that student motivation indicates a significant relationship with learning outcomes, and it has no significant impact on student satisfaction. Basuony *et al.* [11] reported that motivation has a significant and positive effect on the students' satisfaction with online learning during the COVID-19 pandemic. Duraku and Hoxha [20] reported that instructors had used informative approaches that encourage the active participation and motivation of students in the face-to-face classroom. On the other hand, online learning prevents interacting with students and motivating them. Student motivation is an important determinant of perceived student learning [10]. A study [5] reported that students at GSU were motivated to online learning regardless of the environment. Some aspects of student motivation can be attributed to access to faculty during the semester, the ability to access course materials and recorded lectures asynchronously, and the flexibility of schedules provided by the university during this particular period.

2.3. Course structure

According to Harsasi and Sutawijaya [21], course structure was considered as one of the most important factors that determine the satisfaction of online learning. Eom *et al.* [22] indicated that the students were satisfied if the course structure was well organized and presented a logical layout. The findings revealed an insignificant relationship between course structure and the learning outcome. According to a study [11], the course structure is not a significant factor in determining student satisfaction. Baber [10] examined the determinants of students' perceived learning outcomes and their influence on student satisfaction among undergraduate students in South Korea and India during the COVID-19 pandemic. Research findings indicate that course structure is a critical determinant of perceived student learning.

2.4. E-learning platform

Almusharraf and Khahro [23] revealed that students are satisfied with the assistance extended by the institute in different forms, such as IT issues, online class login problems, learning materials, and academic guidance. Sarvestani *et al.* [17] pointed out that the lack of infrastructure facilities such as the scarcity of physical space to pursue virtual learning, lack of access to resources in the institute, and lack of devices are the most significant problems confronted by the students during the COVID-19 pandemic. Duraku and Hoxha [20] stated that the e-learning platform is the only challenge to many students—the limited access to the internet and lack of the technical know-how of technological devices were also indicated as issues for the students. Basuony *et al.* [11] reported that the learning platform has a significant consequence on student satisfaction, and the students are unhappy with the platform provided by the universities. The reasons are the highly complicated system and lack of the technical know-how of these platforms.

2.5. Interaction

Alamri and Tyler-Wood [24] indicated that students try to maintain appropriate interaction for online learning with the instructor via the use of videoconferencing, audio channels, online chat rooms, and e-mail. Ku *et al.* [25] revealed that interaction is an essential determinant of perceived student learning and motivation in online education, while Kurucay and Inan [26] suggested that the interaction between learner-learner is also important for student satisfaction. Baber [10] also reported that interconnection among academic adviser and student is an important determinant of student perceived learning. According to Alqurashi [27], learner-content and learner-instructor interactions are some critical factors for student perceived learning and satisfaction.

Based on the literature review, a few research studies have attempted to understand determinants of student satisfaction and perceived learning during the COVID-19 pandemic in Japan. Henriksen *et al.* [28] specified that the COVID-19 pandemic had enforced academic institutions, administrators at these institutions, advisors, and students, to move to the online platform, with which all were not much familiar before this pandemic. Therefore, this study examines the following hypotheses based on Japanese higher education sector.

3. METHOD

The conceptual model has been developed with five constructs to study the impact on perceived learning and student satisfaction during the COVID-19 pandemic. Figure 1 demonstrates the expected relationships between the variables. This study was selected University "A" based on few important of facts. It has more than 90 years of history in education and which is an education institution that supports a wide range of academic fields from humanities to physical sciences. It has nine faculties and 23 academic departments. It is home of large numbers of outstanding researchers who continually announce leading-edge breakthroughs in fields of research and innovations. It presently has about 11,000 internal undergraduate students. Nearly, 20% students registered to the faculty of business management (total students=900) and faculty of economics (total students =1,100). It is easy to adopt online learning for these faculties since all most all subjects are from social science stream. Researchers decided to select respondents from department of

business management (total 650). This research was used inconvenience sampling technique according to Krejcie and Morgan [29], and the sample size for this study is about 242.

Structural equation modeling analysis was done by using free R Studio desktop version of 3.5.1 latent variable model (lavaan' version 0.6-3). The data were collected from undergraduate students enrolled in online learning courses at University "A" by applying convenience sampling technique. A structured questionnaire in the Japanese language was shared via a Google Form. A total of 263 respondents were received, and participants who completed more than 95% of the questionnaire were kept in the analyses (255). The constructs were adapted from the previous studies that relate to the e-learning environment [30], [31]. After CFA analysis, the study included 17 items to measure seven constructs with five-point Likert scale. Five, or seven or ten-point Likert scales are suitable with the CFA and SEM analytical tools [32].

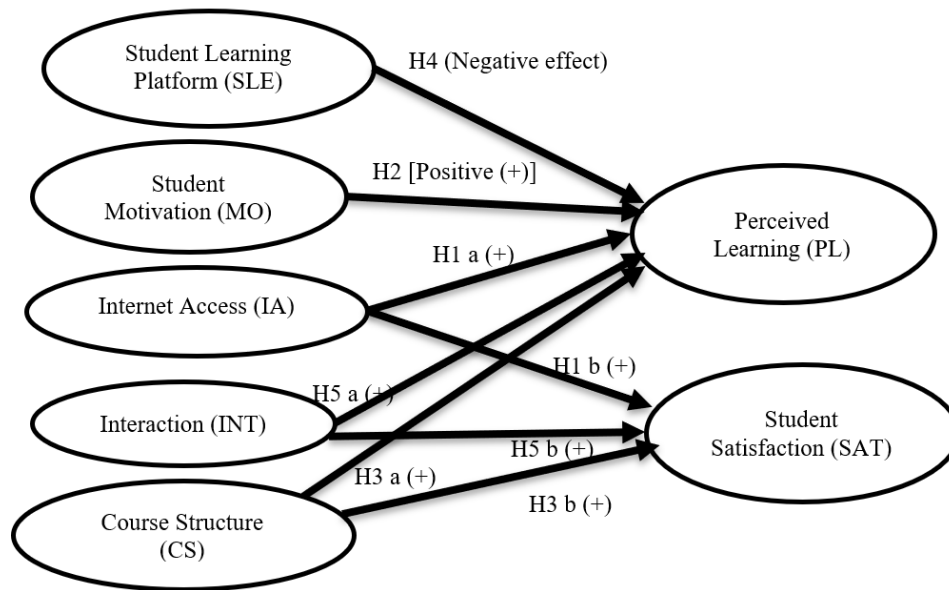


Figure 1. Conceptual framework [7]–[11], [30], [31]

3.1. Reliability, validity, and correlation test results

The Cronbach’s alpha coefficients were calculated for all constructs to determine the reliability of the scale as shown in Table 1. The Cronbach’s alpha value for these constructs was greater than the threshold level of 0.7 in social science. The results of the goodness-of-fit measures (the adjusted goodness-of-fit (AGFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA)) presented in Table 1 shows that all measures are lie in between acceptable range. Accordingly, the constructs explain about 90% of data variance, as shown by the value of the GFI measure.

Table 1. Reliability statistics and GF

Construct	Student satisfaction	IE	Student learning platform	Course structure	Student motivation	Perceived learning	Interaction
Cronbach’s alpha (α)	0.796	0.869	0.827	0.806	0.811	0.796	0.831
Fit measures	GFI	AGFI	TLI	CFI	RMSEA	RMSR	Chi-square
Cut-off	≥ 0.9	≥ 0.8	≥ 0.9	≥ 0.9	0.05-0.08	> 0.08	317.889
Results	0.869	0.803	0.888	0.851	0.081	0.053	Sig. at 1%
Conclusion	Fit	Fit	Fit	Marginal	Fit	Fit	Fit

The researchers examined the relationships of the dependent and independent variables using the bi-variate correlation coefficients as presented in Table 2. All variables were significantly and positively correlated with each other. Further, it presents the skewness, and kurtosis each construct. The mean value for construct ranges from 3.1 to 4.39. The skewness ranges from -0.025 to 0.747. Skewness and kurtosis up to absolute value of 1 indicate normality of the distribution. Skewness and kurtosis values of all the constructs lie in between proposed range.

Table 2 Correlation coefficients, skewness and kurtosis of constructs (N=255)

	Student satisfaction	Internet access	Student learning platform	Course structure	Student motivation	Perceived learning	Interaction	Skewness	Kurtosis
Student satisfaction	1	0.240**	0.447**	0.631**	0.557**	0.762**	0.463**	0.120	-0.401
Internet access		1	0.492**	0.196**	0.186**	0.263**	0.188**	0.747	0.050
Student learning platform			1	0.519**	0.503**	0.277**	0.138	-0.033	
Course structure				1	0.533**	0.607**	0.449**	-0.025	-0.318
Student motivation					1	0.584**	0.503**	0.374	-0.287
Perceived learning						1	0.441**	0.253	-0.715
Interaction							1	0.056	0.050

Note. **. Correlation coefficients are significant at the 0.01 level (2-tailed).

4. RESULTS

Of the total 255, 56% were male, and 44% were female students. Most students have a good and stable connection (95%), while few have poor network coverage. Students further stated that they use more than one device to take part in online learning. The majority of the students use laptops, followed by smartphones to attend online learning. The main issues they encountered during online learning were eye pressure followed by stress and dullness. Most students agree that the new learning mode has unique positives, such as saving time and cost, and adjustable class schedules. Similar findings were found in Sri Lanka [30], [31]. Thus, over 50% of students prefer to continue learning using online platforms in the future.

After examining several models, researchers have finalized the model as indicated in Figure 2. The graphical outcome is shown in Figure 2 and Table 3 presents the standardized structural path coefficient (β) of the model. The result of the SEM model suggests that four hypotheses are accepted, as shown in Table 3. Internet access has a significant relationship with perceived learning ($\beta=0.276$; $p<0.009$). Thus, hypothesis 1a is accepted, and 1b is not tested in the final model. It has an insignificant impact on student satisfaction. Similarly, student motivation has no significant relationship with perceived learning; therefore, hypothesis 2 is rejected. The course structure has a negative influence on student satisfaction ($\beta=-0.577$; $p<0.111$). The greatest influence is from interaction on perceived learning. As illustrated in Table 3, it is evident that interaction does have a statistically significant positive impact ($\beta=1.566$; $p<0.000$, $\beta=1.563$; $p<0.000$) on both perceived student learning and student satisfaction, respectively. Furthermore, the learning platform has a statistically significant negative impact on perceived student learning ($\beta=-0.714$; $p<0.007$).

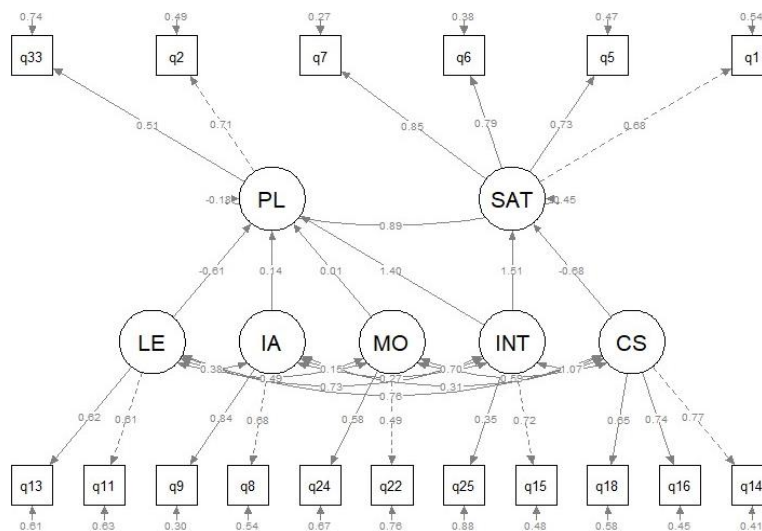


Figure 2. Path diagram-students’ perceived learning and satisfaction with online learning

Table 3. Results of the structural model

		Coefficient	P value	Hypothesis	Decision
Effect on perceived learning	Internet access	0.267	0.009	H1a	Accepted
	Student motivation	-0.012	0.954	H2	Rejected
	Student learning platform	-0.714	0.007	H4	Accepted
	Interaction	1.566	0.000	H5a	Accepted
Effect on student satisfaction	Course structure	-0.577	0.111	H3b	Rejected
	Interaction	1.563	0.000	H5b	Accepted

5. DISCUSSION

The present study contributes to the literature by identifying factors influencing student satisfaction and perceived learning during the COVID-19 pandemic. In this study, five factors were initially identified through the review of literature. The results revealed that interaction has a significant positive influence on students' satisfaction and perceived learning. Thus, hypothesis 5 (H5a and H5b) was accepted. These results are in line with the findings of [10], [27], [33], [34], which show that interaction is a critical determinant of student perceived learning and satisfaction. Obviously, interaction plays a vital role in teaching and learning practice, and it is an essential part of learning in both face-to-face and online setups. It can be identified from instructor to learner or learner to learner. Especially, instructor-to-learner interaction is vital for sharing knowledge and feedback. Thus, interaction is essential in both online and physical settings, to transmit required knowledge and feedback. Internet access indicates a positive significant impact on students' perceived learning. The hypothesis H1a is accepted. University "A" is situated in the Chubu region of Central Japan. Therefore, unlike in rural areas, a Wi-Fi facility with minimum interruptions is available around the city areas. Previous research [11], [15] revealed that the internet has a significant and positive effect on student satisfaction.

According to previous studies, student motivation had a mixed influence on student satisfaction and students' perceived learning. Basuony *et al.* [11] stated that motivation has a significant and positive effect on student satisfaction. In contrast, other studies [9], [22] reported no significant relationship between student motivation and user satisfaction or learning outcomes. As per Table 3, student motivation is not a significant predictor of perceived learning. In Japan, online learning was introduced in higher education sectors and primary and secondary education levels according to the preferences of students and parents. This is one reason why motivation does not indicate a significant relationship with their satisfaction and perceived learning.

Researchers found that course structure has a negative insignificant effect on student satisfaction. Thus, hypothesis 4 (H3b) was rejected. The negative effect of course structure proposes that the content of the course modules, guidelines provided relating to assessments, and learning materials are not well-designed and properly communicated since this is a sudden change. This finding is consistent with the results of previous literatures [9], [10], [35], [36]. Sriyalatha and Kumarasinghe [31] revealed that online learning depends on the curriculum structure. The student learning platform has a significant negative effect on perceived learning. Thus, hypothesis 4 (H4) was accepted. Negative effect shows that the skills and platforms provided by the university are not at the required level according to the students' point of view. We all know the shift from regular classes to the online mode of learning was abrupt due to the COVID-19 pandemic. Hence, the learning platform was never developed to deliver education through this new communication mode. Previous studies produced similar conclusions [20], [37]. Their research findings indicated that available IT infrastructure did not support the new version of learning. Hence, integrating new learning applications and tools into the prevailing structure was necessary. Yildirim *et al.* [38] stated that the lack of knowledge and skills for integrating technology in teaching and the absence of physical conditions and facilities are factors that hinder the quality of online learning and teaching and it create inequalities among students.

Figure 2 presents the results of the final model. Accordingly, it shows that interaction has a positive influence on students' satisfaction and perceived learning. Internet access has a positive impact on students' perceived learning. Further, course structure indicates a negative effect on student satisfaction and student learning platform has a negative effect on perceived learning.

6. CONCLUSION

This study examined the factors influencing student satisfaction and perceived learning during the global pandemic. Variables such as course structure, student motivation, internet access, learning platform, and interaction were considered independent variables, and student satisfaction and their perceived learning were the dependent variables. Interaction is the powerful determinant of perceived learning and satisfaction. Learning platform reveals a negative impact on perceived learning while internet access shows a positive significant impact. Meanwhile, course structure indicates a negative insignificant impact on student satisfaction. It is well known that most higher education institutes are engaged with knowledge dissemination via physical mode, and the COVID-19 pandemic compelled the transition from physical to online platforms. The instructors and academics lacked sufficient time to adjust the course structure accordingly. Therefore, at the very first, we all delivered the knowledge based on the available course structure. Further, these research findings highlighted that specific course learning objectives helped students understand the course expectations clearly. Hence instructors need to design well-structured course structures in compliance with the delivery mode.

This research has some limitations and scope for future research. This study depends on a few variables that depicted the online learning phenomenon. Thus, it is proposed to use more variables, such as, academic self-efficacy, mental resilience, student engagement, and perceived challenges to understand online learning satisfaction. Meantime, students' attributes (gender and family background) potentially impact on

online learning satisfaction. Furthermore, examining satisfaction at the school levels, as well as being encouraged to be better prepared for future catastrophes such as the one we are experiencing in the present pandemic scenario and even in emergency situations such as temporary school closures due to natural disasters or infectious diseases, is essential.




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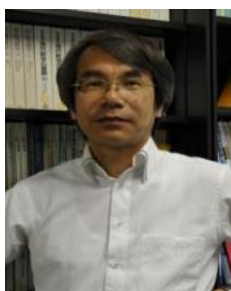
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