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Original Research

E-learning Satisfaction during COVID-19 Pandemic Lockdown: Analyzing Key Mediators

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Abstract

An ample of studies have recently been conducted to explore and analyze the predictors of students' e-learning satisfaction (ELS) during the COVID 19 pandemic lockdown. However, research is scarce on investigating mediating roles of key aspects, such as students' learning stress (SLS) and students' willingness to learn (SWL). This research intends to investigate mediating effect of SLS and SWL in relationships among selected IT characteristics factors and ELS during lockdown enforced to curb the COVID 19 pandemic. Selected factors of IT characteristics are IT complexity, IT pace change and IT presenteeism. The data was collected through online questionnaire survey on 470 students in Malaysia selected by employing the convenience sampling during the Movement Control Order period when universities and colleges shifted to online learning platforms. The data was then subjected purification, assessment of normality and reliability. Thereafter, confirmatory factor analysis and validity assessment were conducted. Finally, hypotheses were tested by formulating structural equation model using IBM SPSS AMOS 24.0. The mediation effects were tested by developing parallel mediation structural model. The findings show that SLS fully mediates relationship between IT pace change and ELS. Students' willingness to study fully mediates relationships between IT presenteeism and IT pace change with ELS.

Keywords: E-Learning satisfaction, learning stress, willingness to learn, IT characteristics, lockdown learning, COVID 19.

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Introductıon

The ongoing pandemic caused by novel coronavirus was originated in Wuhan, China in December 2019 and then spread quickly across the globe (Wang, Di, Ye, & Wei, 2021). The scientific community named the virus as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (Sakib, Bhuiyan, & Hossain, 2020) and the disease caused by it as COVID-19. Since the World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020, many countries opted for enforcement of lockdown to curb the virus spread (WHO, 2020). Additionally, governments of several countries imposed physical distancing, halted face-to-face teaching-learning, and restrictions on immigration (Gonzalez, de la Rubia, & Hincz, 2020).

Eventually, after a brief stint and some noticeable decline in virus spread, the spike in infections again resulted in return of lockdown measures in many countries from mid-September 2020 (WHO, 2020). In addition, the implementation of physical distancing and other similar measures during COVID-19 pandemic has forced educational institutions to vacate the classrooms and ensure that students are away from the campus (Wan, 2020). Throughout such lockdown, educational institutions have been implementing a transition from classroom-based teaching to online teaching method or a blended learning method (UNESCO, 2020). According to (UNESCO, 2020), around 600 million school-going learners are affected across the world due to closure of educational institutions. During the lockdown, teachers were instructed to teach through online learning platforms (Abidah, Hidaayatullaah, Simamora, Fehabutar, & Mutakinati, 2020).

Although universities have been taking a stand that the disruption in student learning environment is compensated by providing online teaching, several challenges can be identified which make this pandemic e-learning stressful (Dhawan 2020; Islam, Bodrud-Doza, & Khan, 2020; Kapasia, Paul & Roy, 2020). Mainly, two aspects are related to adverse impact of COVID-19 pandemic on online education. First, according to some experts, transition to e-learning can be challenging considering short time allocated, lack of training, and lack of suitable infrastructure (Pajarianto, Kadir, & Galugu, 2020; Rehman, Shahnawaz, & Khan, 2020; Son, Hegde & Smith, 2020). Second, in addition to the education sector, the economy got affected by the pandemic. Such adverse impact on economy started resulting in financial vulnerability of college students (Ali, Alam, & Rizvi, 2020). While some students are worried about university fees, others are facing lack of internet connection and other infrastructure related issues. Also, being confined at home, some of the faculty and students have been busy trying to manage their children, other elders, or siblings in their houses (Rehman, Shahnawaz, & Khan, 2020).

Several researchers have identified other challenges for e-learning in existing literature, which include issues relating to time management, use of technology tools, students' assessment, communication, and the lack of in-person interaction (Sahu, 2020). Challenges to the online environment during an emergency may create additional stress because of such technology-enabled education (Chi, Becker, & Yu, 2020). Specifically, in the process of transition to e-learning, both instructors and students may experience disconnection and unclear expectations related to e-learning (Anderson, Imdieke, & Standerford, 2011).

On the other hand, the pandemic has aggregated issues related to mental health, psychological burdens etc. (Samadarshi, Sharma, & Bhatta, 2020). A review of stressors created by recent pandemic highlights factors, such as infection fears, frustration,

boredom, inadequate supplies of daily essentials, inadequate information, financial loss, and stigma (Rehman, Shahnawaz, & Khan, 2020). Although several studies focused such stress factors and their impacts on productivity during the pandemic, such studies are limited to health workers, patients, children and general population. The role of such stressors on ELS and engagement is less explored. However, with the exception of a few studies, notably from China (Chi, Becker, & Yu, 2020), there is a sparse evidence of the psychological or mental health effects of the current pandemic on college students, who are known to be a vulnerable population (Samadarshi, Sharma, & Bhatta, 2020).

Despite various difficulties and challenges, transition to e-learning can be achieved effectively with students' willingness to study online. This can be explained best with example of 18-year-old Universiti Malaysia Sabah student Veveonah Mosibin. This extraordinary Sabahan student spent 24 hours on a tree just to get stable internet connection for her online exams, which also serves as a reminder that there are people who still struggle to get the most basic thing which almost all of us have today — internet connectivity. Instead of whining and throwing a tantrum, she looked for a tall tree and climbed it just to get better reception of network.

Empirical research related to learning motivation shows that students' subject value of a task predicts task choice (Harackiewicz, Durik, & Barron, 2008). The importance of task value should increase with students' freedom of choice and is important prerequisite for engagement in learning activities. Hence the task value is supposed to be important for students' willingness to participate voluntarily in education and learning activities (Knowles, Holton, & Swanson, 2005). Recently, Gorges and Kandler (2012) showed that adult students use (recollected) school-based learning motivations as a basis to assess task value with respect to a new but similar learning opportunity. Thus, in the same way as knowledge and skills acquired in school form the basis for further cognitive development and learning (Helmke & Weinert, 1997). Adult learners' willingness to learn appears to be rooted in school-based motivational experiences recollected in adulthood. Extending these theoretical foundations, current research argues importance of SWL as key factor influencing ELS during pandemic. Considering lack of empirical research in this regard justifies pressing need to uncover roles of such factors on ELS which may challenge students' learning engagement and outcome.

The objective is to investigate mediating role of students' SLS and students' (SWL) among relationship between independent variables of selected IT characteristics which are IT complexity (ITCX), IT pace change (ITPC) and IT presenteeism (ITPN) and dependent variable ELS. Following research questions are then formulated accordingly. The key research questions are: Does student SLS mediate relationship between IT characteristics and ELS? Does student willingness mediate relationship between IT characteristics and ELS?

Literature Review

Online Learning

Several authors have described online learning as access to learning experiences via the use of some kind of technology (Benson, 2002; Carliner, 2004; Conrad, 2002). Both Benson (2002) and Conrad (2002) identified online learning as a more recent version of

distance learning which improves access to educational opportunities for learners described as both nontraditional and disenfranchised. Online learning is a well-researched concept in existing literature where several researchers have investigated aspects like technology design, evaluation, pedagogical design (Hsu, 2012) instructors and students' perception, expectations (Haba & Dastane, 2019; Hashim, Mukhtar, & Safie, 2019; Kayali, Safie, & Mukhtar, 2019), styles of teaching and learning (Martin, Ahlgrim-Delzell, & Budhrani, 2017). Some studies uncovered challenges faced in implementing online learning or in transition from traditional classroom-based learning to e-learning. Such challenges can be listed as students' feeling of disconnection from familiar teaching and learning methods, lack of personal touch, lack of feedback to help teachers to improve teaching (Anderson, Imdieke, & Standerford, 2011).

IT Characteristics and ELS

There are well established studies related to IT characteristics framework for ELS(Hashim, Mukhtar, & Safie, 2019; Kayali, Safie, & Mukhtar, 2019). Prior researchers e.g. (Kinshuk, & Yang, 2003; Wu, Tennyson, Hsia, & Liao, 2008; Yang & Liu, 2007) indicated both positive and negative aspects of the e-learning environments. Technological issues, financial constraints, lack of ICT skills are some of the challenges highlighted in the findings of those studies. Such findings are recorded from the research belong to both developed and developing countries (Almaiah, & Alyoussef, 2019; Almaiah, Al-Khasawneh, & Althunibat, 2020). Satisfaction is a well-established consequence of user acceptance, IT characteristics as well as system characteristics. Construct of satisfaction is often used to measure learners' satisfaction in learning-related studies (Piccoli, Ahmad, & Ives, 2001). Prior research in e-education found that perceived ease of use and perceived value were positively related to student satisfaction, whereas perceived ease of use was positively related to perceived value (Haba, & Dastane, 2019; Martins & Kellermanns, 2004; Safie, & Morshidi, 2007; Satar et al., 2019).

Recently, there is a surge in research articles investigating impacts of COVID-19 on various sectors, such as business, finance, environment, job prospects, tourism etc. (Bartik, Bertrand, Cullen, 2020; Ferneini, 2020; and Seetharaman, 2020). There are some studies related to higher education sector and impact on student mobility (Roy et al., 2017; Strielkowski, 2020). E-learning is not an exception and some studies can be spotted in this stream as well (Manzoor, 2020; Scagnoli & Choo, 2019). Shahzad, Hassan, Aremu (2020) investigated the impact of COVID-19 on e-learning for higher education students and compared the impact between male and female groups. The findings of the study reveal that males and females have a different level of in terms of usage of towards E-learning portals in Malaysian Universities. E-learning perception of students during lockdown duration was explored as well as investigated its impact on ELS by various researchers (Haba & Dastane, 2019; Martins & Kellermanns, 2004). Sandars, Correia, and Dankbaar, (2020) offered tips for rapid migration to digital platforms and highlighted on technological and IT characteristics aspects and their impact on ELS.

Students' Learning Stress (SLS)

Palmer (2013) defines stress as perceived pressure exceeding one's perceived ability to cope. Thus, stress is always perceived and not real, meaning a situation can be stressful

for a given individual if such individual cannot cope up with the situation. The subject (affected individual) can only claim as being stressful when there is a medical diagnosis concluding that stress is the cause of symptoms displayed by the subject. Therefore, it can be said that the subject has really experienced the stress. This also means, the affected individual is not just putting external label. Therefore, it can be said that a situation, which is stressful for one student may not be stressful for others. Some studies claim that stress related to e-learning can be minimized through better infrastructure, course design, delivery timing etc. Existing literature is sparse when it comes to stress related to distance or online learning. The study of Scott, Durnell and Gauvin (1997) on Australian universities have revealed that blended learning and collaborative work can cause stress when there are time constraints. Simpson (2000) discusses stress in the context of distance learning but focused on stress management rather than investigating impact of such stress. However, for the context of current research, the stress is not just considered the one arising from above aspects. This research also includes factors generated by COVID-19 pandemic and effect of such factors on SLS. Previous studies emphasized on aspects, such as perceived value, behavioral intension, technological aspects, instructors, instructor related issues etc. (Safie, Morshidi, & Dastane, 2020) and its impact on ELS However, mediating role of stress is less addressed. Therefore, this study formulates following hypothesis:

H1: SLS mediates relationship between ITCX and ELS.

H2: SLS mediates relationship between ITPC and ELS.

H3: SLS mediates relationship between ITPN and ELS.

Students' Willingness to Learn (SWL)

Willingness to learn or learning motivation is a well discussed topic in existing literature. It has three prominent approaches, such as achievement of goals, self-determination, and personal interest (Schunk & Zimmerman, 2012).

Firstly, according to the theory of achievement goals, students pursue superordinate goals while learning (Ames, 1984). Literature discusses two dimensions of goals namely mastery vs. performance on the one hand, and approach vs. avoidance on the other (Elliot, & Church, 1997). Students having approach of mastery goals strives to develop competence through individual frame of reference (Anderman & Maehr, 1994). On the other hand, performance-approach oriented students work hard to compete and outperform others while performance-avoidance oriented students seek not to perform worse than others do (Elliot & Church, 1997). In a nutshell, for this category of students, a learning opportunity promises success only when they feel they can meet demands and tasks are capable enough to provide them some kind of benefits.

Secondly, Reeve, Deci and Ryan (2004) extended the extrinsic and intrinsic motivation approach and coined self-determination theory which infers a stepwise transition from externally to internally motivated activities. According to this theory, motivated person continuously values the activity as important internally motivated behavior feels self-

determined without being intrinsically motivated; that is, this behavior is not an end in itself (Reeve et al., 2004).

Thirdly, individual and personal interest refer to the liking of and the willful engagement in activities related to particular object (Deci et al., 1992). Personal interest gains importance with age and reflect perceived value of a learning opportunity or at least a part of it. Students often see interest as the most important construct for (learning) motivation. A broad range of interests is one of the best prerequisites for successful and enjoyable learning in primary, secondary, higher, and further education (Krapp, 2000).

Previous studies emphasized aspects, such as learning motivations, intend to study etc. (Safie et al., 2020) and its impact on ELS. However, mediating role of stress is less addressed. Therefore, following hypothesis are formulated:

H4: SWL mediates relationship between ITCX and ELS.

H5: SWL mediates relationship between ITPC and ELS.

H6: SWL mediates relationship between ITPN and ELS.

Methodology

The current study has applied explanatory research along with quantitative method to answer the research questions by studying the relationship among independent and dependent variables. Positivism and deductive approach are used as the study is in epistemological stances. A self-administered questionnaire was used to collect empirical data. The questionnaire in the form of google form were circulated online among university students in Malaysia during April 20 to July 20 when there was a shift of university teaching and learning to online platform because of enforcement of Movement Control Order (MCO) and Recovery MCO (RMCO) which resulted in lockdown. Total sample of 470 was collected which is sufficient for the analysis considering total items in survey tool and minimum requirement to run analysis using IBM SPSS AMOS. A well-designed format was employed to develop the questionnaire which consisted of items related to ITCX (4 items related to this variable), ITPC (4 items related to this variable), ITPN (4 items related to this variable), SLS (10 items), SWL (6 items), ELS (4 items) and demographic related questions. Likert scale of 1-5 was used to measure the strength of attitudes or opinions and all questions of the survey tool were closed ended. Data analysis plan consist a series of steps starting with demographic analysis followed by normality and reliability assessments. Confirmatory factor analysis and structural equation modelling using IBM SPSS AMOS 24 was then carried out. The validity and mediation analyses of the measurement model were also assessed at the end. The hypotheses were subsequently tested, and the results are discussed. The procedures recommended by Donni et al. (2018); Hair, Ringle, and Sarstedt (2013) and Malhotra and Grover (1998) are followed.

Results and Discussion

Demographic Analysis

The survey received total 488 responses and total 470 valid responses were considered for analysis after removing missing data and outliers. The data has fair representation related to several aspects such as gender with 58.9% (277) female and 41.1% (193) male, type of higher education institutions with 57.4% (270) studying with public universities and 42.6% (200) studying with private universities and colleges. 57.2% (269) students are from bachelor degree program, 19.4% (91) studying master program followed by 16.8% (79) studying diploma programs with remaining respondent studying various other courses such as professional and certificates. In terms of fields of studies, majority of 31.1% (146) belong to ITC followed by 23.3% (112) belong to social sciences and humanities and then 21.1% (99) business management. Remaining respondents belong to other programs, such as engineering, medical and religious studies. During the MCO, 75.5% (355) respondents were studying from home while rest 24.5% (115) were studying away from home, such as hostels, friend's house or rented house. Total of 63% (296) respondents were in urban area while remaining were studying online from rural area. Among those who were studying from home or rented house, 48.3% (227) used home wi-fi for e-learning while remaining used prepaid data. Majority 44% (207) students took 4 to 6 courses followed by 36.4% (171) took 1 to 3 courses. In terms of estimated hours spent for e-learning, 31.1% (146) spent 2 to 3 hours, 30% (141) spent 2 hours, 17.2% (81) spent more than four hours, and 17% (80) spent 3 to 4 hours per day for e-learning. In summary, this sample is rich in its composition and representation that highlights several attributes of lockdown learning.

Normality Assessment

Skewness and Kurtosis is assessed to measure normality of data (Malhotra & Grover, 1998). The values indicated that sample data is generally relatively normal and key assumption of testing is fulfilled as the values for both parameters fall within the acceptable range of -1 to + 1 (Hair et al, 2013).

Measurement Model

The primary measurement model could not attain model fit as per rule of thumb and so minor amendments were done as recommended by Awang (2015) such as deletion of items with factor loadings less than 0.5. In addition, as suggested by Awang (2015), redundant items with MI threshold more than 15 were eliminated. This was done through iterative process by deletion of one item at a time and finally model fit was achieved by removing one item from ITCX, ITPC and ELS each and 2 items from SLS and SWL each. Overall model fit is acceptable by several standard fit measures—the statistic of Chi-square and Adjusted Goodness of Fit Index (AGFI). Goodness of Fit Index (CFI) and Root Mean Squared Error of Approximation (RMSEA) are unambiguously supported and accepted model fit. The score of Chi-square is 3.262, AGFI is 0.847, CFI is 0.928, Tuker-Lewis's index (TLI) is 0.916, Normed Fit Index (NFI) is 0.900 and RMSEA is 0.069 in this measurement model. Therefore, the results are competent to proceed for hypothesis testing to evaluate further if there are significant relationship exist. The final measurement model is displayed in figure 1 which thus achieved absolute good fit, parsimonious fit, and incremental fit based on the model fit indices listed in table 1.

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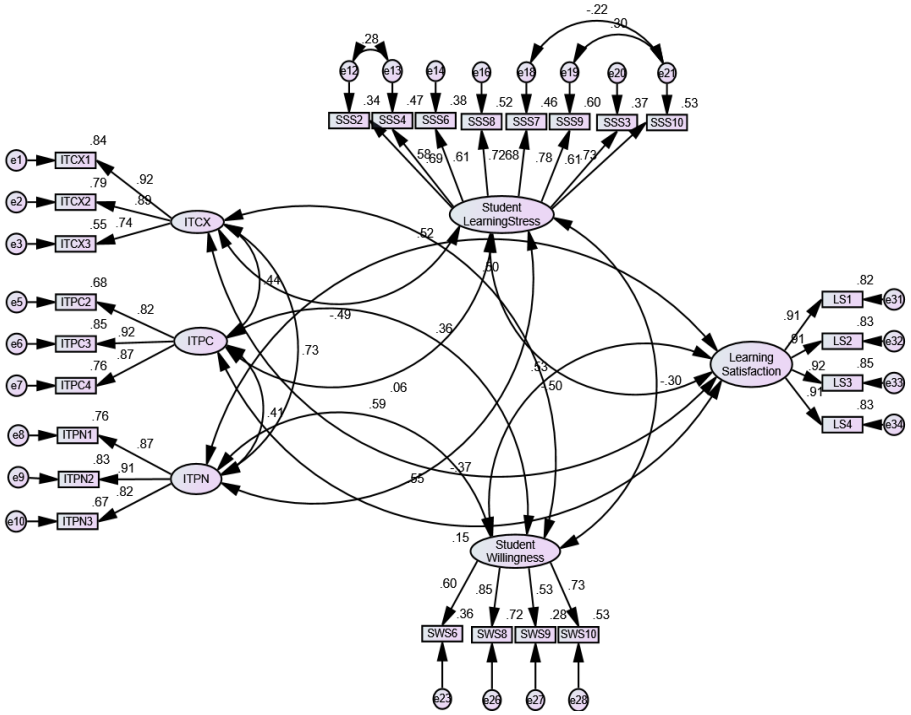

Figure 1: Measurement Model

Table 1: Model Fit Indices for Measurement Model

Category	Index	Level of Acceptance	Index Value	Comments
Absolute Fit	Chi-Square	< 0.05	.000	Supported
	RMSEA	< 0.08	0.069	Acceptable
	GFI	> 0.90	.879	Near Threshold
Incremental Fit	AGFI	> 0.80	.847	Acceptable
	CFI	> 0.90	.928	Acceptable
	TLI	> 0.90	.916	Acceptable
	NFI	> 0.90	.900	Acceptable
Parsimonious Fit	Chisq / df	< 5.0	3.262	Acceptable

Validity Assessment

We then looked into validity assessment considering the evaluation of convergent, divergent and discriminant validity. According to Awang (2015) and Malhotra and Grover (1998), the convergent validity is achieved when all AVE values exceeded 0.50, whereas the composite reliability (CR) is achieved when all of its values were exceeded 0.60. As listed in table 2, total factor loadings were more than 0.7, and all cross-loadings were less than 0.5, which means that the dataset satisfied the validity of the sample. Cronbach's alpha was calculated for each factor to assess construct reliability, and the value for each variable was within the best level of reliability (>0.900). Discriminant validity was achieved as displayed in table 3 and table 4. There were no concerns related to scale reliability, divergent, and convergent validity.

Table 2: Convergent and Divergent Validity Assessment

Construct	Loadings	CR	AVE
ITCX	> 0.7	0.887	0.725
ITPC	> 0.7	0.905	0.761
ITPN	> 0.7	0.901	0.753
SLS	> 0.7	0.870	0.500
SWL	> 0.7	0.775	0.500
ELS	> 0.7	0.953	0.834

Table 3: Discriminant Validity Assessment – Part I

Construct	CR	AVE	MSV	MaxR(H)
ITCX	0.887	0.725	0.53	0.909
ITPC	0.905	0.761	0.194	0.915
ITPN	0.901	0.753	0.53	0.911
SLS	0.870	0.500	0.251	0.877
SWL	0.775	0.500	0.345	0.823
ELS	0.953	0.834	0.298	0.953

Table 4: Discriminant Validity Assessment – Part II

Construct	ITCX	ITPC	ITPN	SLS	SWL	ELS
ITCX	0.851					
ITPC	0.441	0.873				
ITPN	0.728	0.407	0.868			
SLS	-0.49	0.059	-0.369	0.677		
SWL	0.499	0.355	0.587	-0.295	0.687	
ELS	0.546	0.154	0.515	-0.501	0.532	0.913

Structural Equation Modelling

Next, structural equation model was formed to test direct effect of independent variables on ELS first and then followed by testing of mediation effect of SLS and SWL among independent variables and ELS.

Direct Effect

The direct impact of ITPN, ITCX, ITPC is assessed on ELS through the structural model omitting both mediator variables viz SLS and SWL. The model was considered to be acceptable because it achieved an absolute fit (RMEA = 0.080, GFI = 0.910) and incremental fir (CFI = 0.953, TLI = 0.940, NFI = 0.941). The figure 2 shows corresponding structural model. Table 5 displays model fit indices of the structural model.

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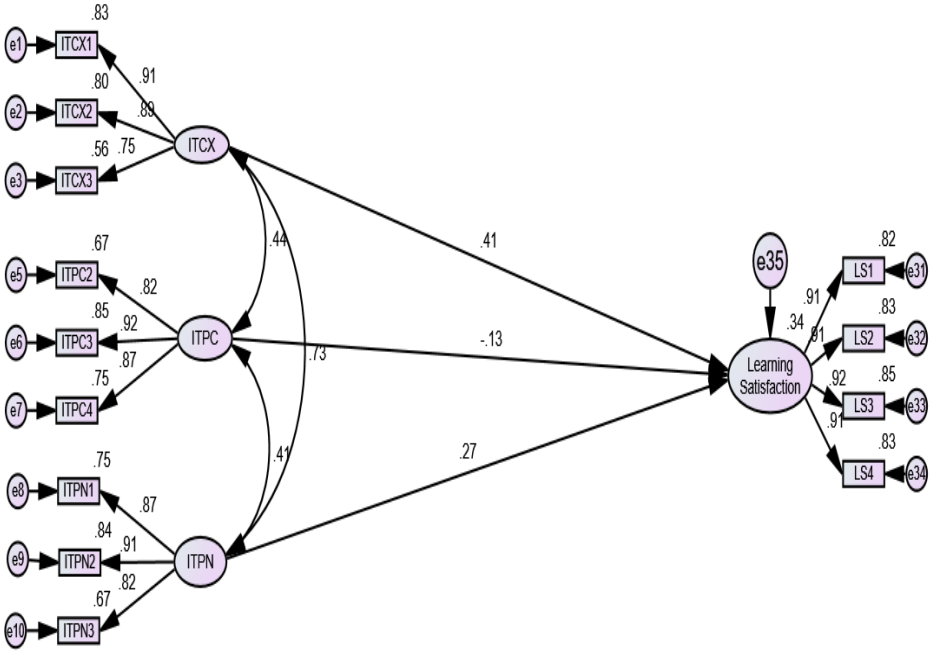

Figure 2: Structural Model (Direct effect)

Table 6: Model Fit Indices – Structural Model with Direct Effect

Category	Index	Level of Acceptance	Index Value	Comments
Absolute Fit	Chi-Square	P-Values < 0.05	.000	Supported
	RMSEA	< 0.08	0.080	Acceptable
	GFI	> 0.90	.930	Acceptable
Incremental Fit	AGFI	> 0.80	.892	Acceptable
	CFI	> 0.90	.965	Acceptable
	TLI	> 0.90	.954	Acceptable
	NFI	> 0.90	.954	Acceptable
Parsimonious Fit	Chisq / df	< 5.0	4.145	Acceptable

As displayed in table 6, impacts of all three variables on ELS are significant ($p < 0.05$). ITCX has strongest impact of 42.3% ($p < 0.01$) among three followed by ITPN which is 25.8% ($p < 0.01$). ITPC demonstrated -13.7% impact ($p < 0.05$).

Table 7: Standardized Estimates with Significance – Direct Effect

Dependent Variable		Independent Variable	Beta Value	P-Value
ELS	<---	ITCX	.408	***
ELS	<---	ITPC	-.135	0.005
ELS	<---	ITPN	.271	***

As all three independent variables have significant impact on dependent variables, structural model with mediators can be constructed and analyzed.

Mediating Effect

Parallel mediating effect of SLS and SWL is then assessed among dependent and independent variables. The model as displayed in figure 3 is considered to be a good fit because it achieved an absolute fit (RMEA = 0.0069, AGFI = 0.846) and incremental fit (CFI = 0.927, TLI = 0.916, NFI = 0.900). Table 8 displays model fit indices of the structural model with both mediators.

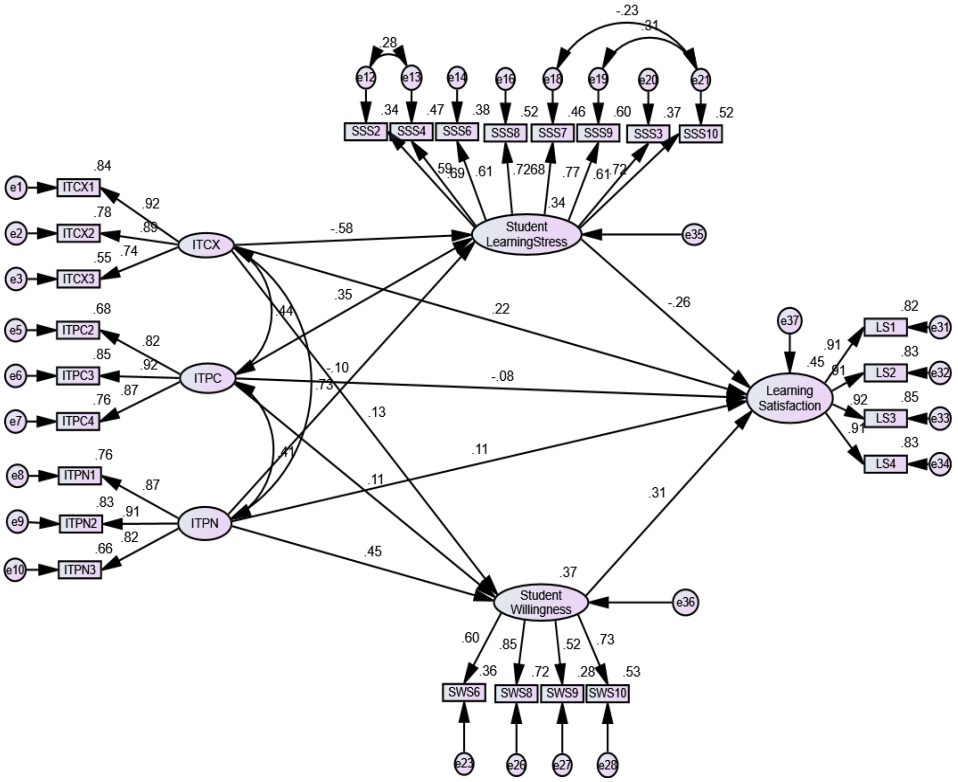

Figure 3: Structural Model (Mediating effect)

Table 8: Model Fit Indices - Structural Model with Mediating Effect

Category	Index	Level of Acceptance	Index Value	Comments
Absolute Fit	Chi-Square	P-Values < 0.05	.000	Supported
	RMSEA	< 0.08	0.069	Acceptable
	GFI	> 0.90	.878	Acceptable
Incremental Fit	AGFI	> 0.80	.846	Acceptable
	CFI	> 0.90	.927	Acceptable
	TLI	> 0.90	.916	Acceptable
	NFI	> 0.90	.900	Acceptable
Parsimonious Fit	Chisq / df	< 5.0	3.264	Acceptable

Hypothesis Testing

This section discusses the results of hypothesis testing along with discussion on findings.

Table 9: Standardized Estimates with Significance – Mediating Effect

Dependent Variable		Independent Variable	Beta Value	P-Value
SLS	<---	ITCX	-.575	***
SLS	<---	ITPC	.350	***
SLS	<---	ITPN	-.097	.182
SWL	<---	ITCX	.127	.090
SWL	<---	ITPC	.113	.030
SWL	<---	ITPN	.450	***
ELS	<---	SLS	-.260	***
ELS	<---	SWL	.314	***
ELS	<---	ITCX	.220	.003
ELS	<---	ITPC	-.084	.088
ELS	<---	ITPN	.111	.104

The mediating effect of SLS and SWL were tested parallelly and results are discussed as below:

SLS Mediation

SLS as a mediator was tested parallelly with SWL and its mediating effects were analyzed among all three independent variables and LS. Firstly, for ITCX, indirect effect of ITCX on ELS through SLS can be calculated from the results displayed in figure 3 and table 7 as .149 (-.575 X -.260) which is less than direct effect of ITCX on ELS as .220. All values are significant and it can be concluded that there is no mediation in this regard. Thus, hypothesis 1 which is, SLS mediates relationship between ITCX and ELS, is rejected. For ITPC, direct impact of ITPC on LS is not significant with standard estimate of -.084 which is lesser than indirect effect as -.091 (.350 X -.260) and so it can be said that a full mediation occurs. In this case, hypothesis 2 that SLS mediates relationship between ITPC and ELS, is accepted. Regarding ITPN, effect on SLS is not significant and so it can be concluded that there is no mediation for this variable and therefore, hypothesis 3, SLS mediates relationship between ITPN and ELS, is rejected.

SWL Mediation

Mediating effect of SWL was then tested and analyzed in parallel with SLS among all three independent variables and ELS. First, for ITCX, its impact on SWL is not significant and so there is no mediation occurred. Hence hypothesis 4 that SWL mediates relationship between ITCX and ELS, is rejected. Second, for ITPC, direct impact of ITPC on ELS is not significant with standard estimate of -.084 which is less than indirect effect as .035 (.113 X .314) and so it can be said that a mediation occurs. In this case, it can be said as full mediation. Therefore, hypothesis 5 that SWL mediates relationship between ITPC and ELS, is accepted. Third, for ITPN, direct impact of ITPN on ELS is not significant with standard estimate of .111 which is less than indirect effect as .141 (.450 X .314) and so it can be said that a mediation occurs. The nature of mediation in this case is full. Thus, hypothesis 6 that SWL mediates relationship between ITPN and ELS, is accepted.

Conclusion

The current study is mainly oriented towards testing mediation of selected variables in relation to the effects of selected IT characteristics on ELS. Firstly, mediating effect of SLS was tested and it was found out that SLS mediates relationship between ITPC and ELS fully. There was no mediation spotted among relationships between ITCX and ITPN. It can be concluded that SLS is important when coping with pace change as for this particular IT characteristics, ELS is mediated by students' stress generated from online learning. This is in line with findings of Scott et al. (1997) and Simpson (2000). However, current study further contributes by uncovering these aspects in the view of stress generated due to pandemic. This finding has implications for IT managers as well as other facilitators of online learning. The stress arising from learning need to be minimized in order to ensure ELS while coping with IT pace change.

Based on the test result of mediating effect of SWL, it can be concluded that SWL fully mediates relationship between ITPC and LS as well as between ITPN and LS. The finding is in line with outcome of research conducted by Reeve et al. (2004). Out of three selected IT characteristics, the impact of ITCX on ELS is not mediated by SWL. Therefore, it can be concluded that, although there is a presence of SWL, ITCX needs to be managed effectively in order to achieve ELS. On the contrary, pace change as well we presenteeism's relationship with ELS is mediated by SWL which implies pace change can be well managed if learning facilitators motivates and generates willingness to study among students. Current study uncovers these novel findings in the context of ELS during pandemic learning.

Overall, it can be concluded that both SLS and SWL mediates relationship between one or more of the selected IT characteristics and ELS. Therefore, in order to enhance ELS, merely focusing on developing efficient and effective IT characteristics would be of less utility if learners encounter SLS. It is recommended that aspects related to reduction of SLS arising from e-learning needs to be minimized. This can be done by providing adequate training related to online learning portals. In addition, creating supporting learning environment by enhancing value of learning management systems is recommended. At the same time, efforts need to be taken to foster SWL as it can nullify adverse effect of SLS on ELS. SWL is attribute mainly related to internal motivation. However, external factors like rewards, success stories of peers and motivational sessions can reflect in an internal drive which may further generate SWL. Learning management system developers, learning facilitators, lecturers and IT managers are recommended to focus on reducing SLS and fostering SWL in online learning along with enhancing aspects related to IT characteristics.

Previous studies focused on e-learning infrastructure, learning facilities, IT characteristics, instructors and teaching material etc. and its impact of ELS. However mediating role of stress and SWL was less addressed. Thus, the current study has fulfilled this research gap. This research has contextualized the meaning of stress and willingness considering factors arising from COVID-19 pandemic. Existing literature is sparse when it comes to measuring mediating effect of selected variables in particular situation arise because of COVID-19. Therefore, the study is resulting in novel outcome and a definite contribution to the existing literature.

This research has few limitations. Firstly, limited factors are selected to investigate impact on ELS. Ample of factors are involved when it comes to COVID-19 pandemic lockdown ELS including learning climate, IT infrastructure availability etc. Secondly, data is collected from students studying with Malaysian universities which may pose issues related to generalizability of the study. In addition, convenience sampling also adds on issues related to generalizing the study. Future studies should consider several other factors as highlighted above. In addition, mediating role of such factors also needs to be investigated. Future studies also can focus on moderating effect of gender, age, teaching style and IT literacy.

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