Evaluating the Culture of Online Learning and its Effectiveness Amidst the Covid-19 Pandemic

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ABSTRACT

This paper analyzed the success factors of online learning using a comprehensive multidimensional approach. The model was empirically tested using 323 observations gathered from an online survey questionnaire from students of Faculty of Arts and Letters at the University of Santo Tomas. The relationships among the constructs were tested using Structural Equation Modelling. Results show that the human entities (learner quality, support system quality, and instructor quality) have a significant impact on perceived satisfaction and not the non-human entities (technical system quality, information quality, service quality, and educational system quality). Results show that perceived usefulness is a determinant of system use and perceived satisfaction and perceived satisfaction, system use, and perceived usefulness are all factors of the learners' benefits.

Keywords: E-learning success; structural equation modeling; online learning; learning management system

1. INTRODUCTION

The COVID-19 pandemic has changed how we live our lives, including education. Many schools and universities across the world have closed their classrooms and opened virtual classrooms, including the Philippines, shifting to fully online learning. According to Moore et al (2011) "Online learning or e-learning refers to some form of interaction between two parties (a learner and an instructor) held at different times and/or places and uses varying forms of instructional materials". With the use of technology and the internet, the students and instructors can interact in a learning environment that is web-based, known as Learning Management System (LMS) (Alias and Zainuddin, 2005).

In order to maximize the effectiveness of the adopted LMS of an educational institution, it is necessary to analyze the e-learning success factors. Al-Fraihat et al (2020) made an extensive literature review and showed that there are four categories in terms of measuring the success of e-learning. The first is DeLone and McLean (1992, 2003) information system success model that used the following variables: quality, information quality, service quality, use, user satisfaction, and net benefits (perceived individual impact and organizational impact). The second is the Technology Acceptance Model (TAM) developed by Davis et al. (1989). TAM has the following constructs: perceived usefulness, perceived ease of use, behavioral intention to use, and actual system use. Over time, the TAM was extended by having more constructs such as subjective norm, voluntariness, experience, and image (Venkatesh & Davis, 2000). The third category is the User Satisfaction Models which postulate satisfaction as the main determinant of success, effectiveness, usage and acceptance of information systems. And the

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fourth category focuses on the overall quality of e-learning, thus called as the e-Learning Quality Models.

The objective of this paper is to analyze the success factors by adopting the approach done of Al-Fraihat et al. (2020), a comprehensive multidimensional model that considers the main dimensions and sub-dimensions of the four categories above which integrates human entities and non-human entities involved in the LMS.

2. THEORETICAL MODEL

2.1. Constructs

Following Al-Fraihat et al. (2020), the model is composed of the following theoretical constructs: technical system quality (TSQ), information quality (INQ), service quality (SRQ), educational system quality (ESQ), support system quality (SUP), learner quality (LQ), and instructor quality (INQ), perceived satisfaction (SAT), perceived usefulness (USF), system use (USE), and benefits (BNFT).

Technical system quality refers to ease of use, ease to learn, user requirements, system features, system availability, flexibility, and integration (Davis et al., 1989, Delone and McLean, 2003; Sedera, Gable, & Chan, 2004; Selim, 2003). Information quality refers to sufficiency, accessibility, usability, conciseness, understandability, and up-to-date content of the e-learning system (Delone and McLean, 2003; Ozkan and Koseler, 2009; Sedera et. al, 2004; Selim, 2003). Service quality looks into the following: providing guidance services, providing help, staff availability, staff availability, fair understanding, and responsiveness (Chang and King, 2005; DeLone and McLean, 2003; Hassanzadeh et al, 2012; Holsapple and Lee-Post, 2006; Ozkan and Koseler, 2009). Educational system quality is a construct that summarizes the following features of the e-learning system: interactivity and communication, effective communication, diversity of learning styles, and evaluation components (Hasssanzadeh et al. 2012; Selim, 2003; Sun et al, 2008). Support system quality concerns the ethical issues, behavioral considerations, legal issues, and promotion of the e-learning system (Khan, 2005; Ozkan and Koseler, 2009). Leaner quality summarizes the leaner's behavior, attitude, anxiety, previous experience with an e-learning system, and self-efficacy (Davis et al, 1989; Picoli, Ahmad and Ives, 2001; Roca, et al, 2006; Sun et al, 2008;). Instructor quality captures the instructor's enthusiasm, responsiveness, and interactive communication (Ozkan and Koseler, 2009; Sun et al, 2008).

Perceived satisfaction is a measurement for satisfaction with system performance, enjoyable experience, and providing educational needs (Arbaugh, 2000; Cidral et al., 2018; Hassanzadeh et al, 2012). Perceived usefulness: accomplishing tasks quickly, improving learning performance, effective learning, and overall usefulness (Pituch and Lee, 2006; Rai et al., 2002; Roca et al, 2006; Selim, 2003; Venkatesh and Davis, 2000). Benefit: increasing knowledge, improving learning process, easier interaction and communication, time and cost saving, and achieving learning goals (Almutairi and Subramanian, 2005; Delone and McLean, 2003; Hassanzadeh et al, 2012, Holsapple and Lee-Post, 2006; Rai et al, 2012; Selim, 2003).

Appendix A lists the indicators used for each of the construct which were patterned from the constructs of Al-Fraihat, et al. (2020).

2.2. Research Hypotheses

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H1. Technical system quality positively influences perceived satisfaction of the e-learning system.

H2. Information quality positively influences perceived satisfaction of the e-learning system.

H3. Service quality positively influences perceived satisfaction of the e-learning system.

H4. Educational system quality positively influences perceived satisfaction of the e-learning system.

H5. Support system quality positively influences perceived satisfaction of the e-learning system.

H6. Learner quality positively influences perceived satisfaction of the e-learning system.

H7. Instructor quality positively influences perceived satisfaction of the e-learning system.

H8. Perceived satisfaction toward the e-learning system has a positive influence on the benefits of the user.

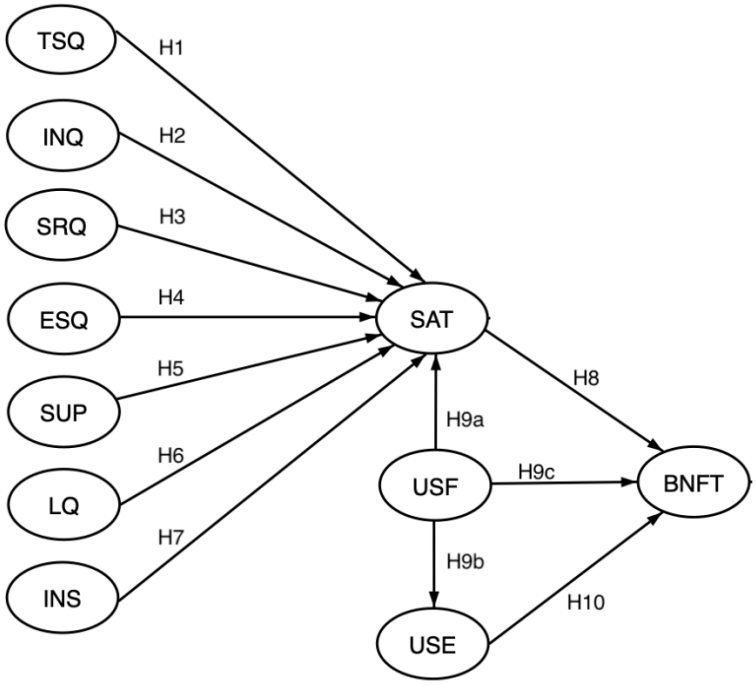
H9a. Perceived usefulness positively influences the perceived satisfaction of the e-learning user.

H9b. Perceived usefulness positively influences the system use of the e-learning user.

H9c. Perceived usefulness positively influences the benefits of the e-learning user.

H10. The system use of the student of the e-learning system positively influences the user benefits.

Figure 1: Evaluating the system success proposed model



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3. RESEARCH METHODOLOGY

Quantitative techniques were employed to create the seven constructs. The data used for this study were gathered from online questionnaire survey (deployed via Google Forms) of 323 respondents, all of which are students of Faculty of Arts and Letters under the program of Bachelor of Arts. The students assessed each indicator based on a 5-point Likert scale: strongly disagree, disagree, neutral, agree, and strongly disagree. Table 1 summarizes the demographic information of the respondents in terms of gender, field of study (major), and age.

Table 1: Sample Characterization

Characteristic	Frequency	Frequency	Percent
Gender	Male	124	38.30%
	Female	199	61.60%
	Total	323	100%
Field of Study	Asian Studies	2	0.6%
	Behavioral Science	5	1.5%
	Communication Arts	38	11.8%
	Economics	170	52.6%
	Journalism	25	7.7%
	Legal Management	65	20.1%
	Literature	14	4.3%
	Philosophy	1	0.3%
	Political Science	2	0.6%
	Sociology	1	0.3%
	Total	323	100%
Age	17	1	0.31%
	18	33	10.20%
	19	103	31.90%
	20	93	28.80%
	21	70	21.70%
	22	16	5.00%
	23	6	1.90%
	32	1	0.31%
	Total	323	100%

4. ANALYSIS AND RESULTS

4.1. Measurement Model Evaluation

In creating the seven constructs, reflective indicators were used. Appendix A shows the indicators used for each of the latent constructs. Each construct was subjected to the following: indicator reliability, internal consistent reliability, and validity.

Indicator reliability was tested using the factor loadings and should be greater than or equal to 0.70 (Bagozzi and Yi, 1998; Hair et. al (2010). Table 2 shows that all indicators have factor loadings (rotated using orthogonal varimax) greater than 0.70. Thus, showing indicator reliability.

Internal consistent reliability was based on Cronbach's Alpha (1951) and Composite Reliability (Werts, Linn, & Joreskog, 1974). Table 2 reports the values of Cronbach's Alpha

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and Composite Reliability which are all greater than the minimum value of 0.70 (Nunnally & Bernstein, 1994; Urbach & Ahlemann, 2010).

Validity of the constructs were tested for convergent validity and discriminant validity. The convergent validity was assessed using the Average Variance Extracted (AVE). As Table 2 shows, all AVEs are above the minimum of 0.50 (Fornell & Larcker 1981), thus all indicators have convergent validity. AVEs exceeded the squared correlations of the indicators showing evidence of discriminant validity, that is the latent construct is free from redundant indicators, (Fornell and Larcker, 1981).

Table 2: Measurement Model Results

Constructs	Items	Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted	Discriminant Validity
Technical System Quality (TSQ)	TSQ1	0.7590	0.8752	0.876	0.501	Yes
	TSQ2	0.7604				
	TSQ3	0.7987				
	TSQ4	0.7751				
	TSQ5	0.7415				
	TSQ6	0.7415				
	TSQ7	0.7150				
Information Quality (INQ)	INQ1	0.7731	0.8888	0.889	0.537	Yes
	INQ2	0.8014				
	INQ3	0.8364				
	INQ4	0.7941				
	INQ5	0.7572				
	INQ6	0.7493				
Service Quality (SRQ)	SRQ1	0.7158	0.8663	0.868	0.569	Yes
	SRQ2	0.7998				
	SRQ3	0.8460				
	SRQ4	0.8246				
	SRQ5	0.8469				
Educational System Quality (ESQ)	ESQ1	0.8024	0.8452	0.846	0.579	Yes
	ESQ2	0.8172				
	ESQ3	0.8581				
	ESQ4	0.8282				
Support System Quality (SUP)	SUP1	0.7326	0.7827	0.759	0.516	Yes
	SUP2	0.7940				
	SUP3	0.8168				
	SUP4	0.7709				
Learner Quality (LQ)	LQ1	0.8377	0.8814	0.882	0.598	Yes
	LQ2	0.8126				
	LQ3	0.8214				
	LQ4	0.8171				

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	LQ5	0.8290				
Instructor Quality (INS)	INS1	0.8445	0.7806	0.781	0.546	Yes
	INS2	0.8462				
	INS3	0.8120				
Perceived Satisfaction (SAT)	SAT1	0.8340	0.8801	0.881	0.651	Yes
	SAT2	0.8571				
	SAT3	0.8419				
	SAT4	0.8989				
Perceived Usefulness (USF)	USF1	0.8560	0.8493	0.851	0.600	Yes
	USF2	0.8743				
	USF3	0.8564				
	USF4	0.7403				
System Use (USE)	USE1	0.8056	0.8163	0.819	0.530	Yes
	USE2	0.8149				
	USE3	0.8370				
	USE4	0.7535				
Benefits (BNFT)	BNFT1	0.7778	0.8551	0.856	0.545	Yes
	BNFT2	0.8091				
	BNFT3	0.7941				
	BNFT4	0.7604				
	BNFT5	0.8392				

4.2 Path Analyses

In order to establish relationships among the latent constructs, path analyses were done. Table 3 summarizes the results of the structural models using Structural Equation Model.

Table 3: Results of Path Analysis and Hypothesis Testing

Hypothesis	Path	β Coefficients	z-Statistics	$P > z$	Support
H1	TSQ → SAT	.1218159	1.60	0.110	Rejected
H2	INQ → SAT	-.0672624	-0.82	0.413	Rejected
H3	SRQ → SAT	.037473	0.54	0.592	Rejected
H4	ESQ → SAT	-.0290182	-0.34	0.732	Rejected
H5	SUP → SAT	.3888738	3.93	0.000	Accepted
H6	LQ → SAT	.331693	3.84	0.000	Accepted
H7	INS → SAT	.1549973	1.92	0.055	Accepted
H8	SAT → BNFT	.2921318	4.28	0.000	Accepted
H9a	USF → SAT	.5010016	7.07	0.000	Accepted

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H9b	USF → USE	.6097527	13.30	0.000	Accepted
H9c	USF → BNFT	.3065861	3.68	0.000	Accepted
H10	USE → BNFT	.3854667	5.81	0.000	Accepted

5. DISCUSSIONS

Hypotheses H1, H2, H3, and H4 did not gain empirical results. This means that technical system quality, information quality, service quality, and educational system quality were not the factors that significantly influenced the perceived satisfaction of the users of the e-learning system.

Hypotheses H5, H6, and H7 were accepted. It implies that support system quality, learner quality, and instructor quality have a direct influence on the perceived satisfaction of the students using e-learning system.

H8 was accepted, thus, perceived satisfaction from the use of the Cloud Campus positively influences the benefits received of the students. This is consistent with the findings of Al-Fraihat, et al. (2020).

H9a and H9b were supported. It indicates that perceived usefulness has a significant influence on the perceived satisfaction and system use. When the students view Cloud Campus as a tool to accomplish task quickly, improve learning performance, and effective learning, the level of satisfaction and use increases.

H10 was accepted. The frequency of use, dependence on system, regular use, and duration of use all were determinants of benefits received by the students in terms of increasing knowledge, improving learning process, easier interaction and communication, time, and cost saving, and achieving learning goals.

6. CONCLUSIONS AND IMPLICATIONS

This study aimed at analyzing the success factors of the e-learning system. The findings reveal that support system quality, learner quality, instructor quality, and perceive usefulness all contribute to the perceived satisfaction of the users of the e-learning system. Perceived usefulness has a direct effect on the system use and these two together with perceived satisfaction are all determinants of benefits. The results are expected to contribute to the growing literatures of the success factors of e-learning system and can be used as a basis for policy formulations of the institution that will adopt the e-learning system. The analysis can be extended to a bigger sample size using random sampling techniques so that the results can be generalized.

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Appendix A: Measurement Items and their Means and Standard Deviations

Construct	Code	Indicator	Mean	Standard Deviation
Technical System Quality (TSQ)	TSQ1	It is easy to use UST Cloud Campus.	2.120743	1.276022
	TSQ2	It is easy to understand the structure of UST Cloud Campus and how to use it.	2.250774	1.298216
	TSQ3	UST Cloud Campus meets my requirements and I can find the information I need.	2.164087	1.290557
	TSQ4	UST Cloud Campus includes the necessary features and functions I need.	2.176471	1.308051
	TSQ5	UST Cloud Campus is always available for me to perform learning activities.	2.331269	1.292061
	TSQ6	UST Cloud Campus is flexible to interact with.	2.30031	1.24595
	TSQ7	All components within UST Cloud Campus are fully integrated and consistent.	2.272446	1.190053
Information Quality (INQ)	INQ1	UST Cloud Campus has provided me with sufficient and required information.	2.198142	1.3156

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	INQ2	Information and resources needed from UST Cloud Campus are always accessible.	2.164087	1.276037
	INQ3	Information from UST Cloud Campus is in a form that is readily useable.	2.170279	1.301736
	INQ4	Information in UST Cloud Campus is concise and clear.	2.157895	1.296133
	INQ5	The structure of UST Cloud Campus is well organized into logical and understandable components.	2.303406	1.297712
	INQ6	The content of UST Cloud Campus is up to date.	2.182663	1.316667
	INQ7	I perceive the design of UST Cloud Campus (e.g. fonts, style, color, images, videos) to be good and meets the quality standards.	2.312693	1.391431
Service Quality (SRQ)	SRQ1	There are enough and clear instructions/training about how to use UST Cloud Campus.	2.294118	1.244939
	SRQ2	UST Cloud Campus provides proper online assistance and help.	2.198142	1.286961
	SRQ3	The UST EdTech staff is available and cooperative when facing an error in UST Cloud Campus.	2.359133	1.251509
	SRQ4	The UST EdTech staff understands the specific needs of students.	2.349845	1.277453
	SRQ5	I receive a satisfactory and timely response from the UST EdTech staff.	2.452012	1.297401
Educational System Quality (ESQ)	ESQ1	UST Cloud Campus provides interactivity and communication facilities such as chat, forums, and announcements.	2.204334	1.331083
	ESQ2	I believe that communication facilities have been effective learning components in my study.	2.204334	1.300399
	ESQ3	UST Cloud Campus provides me with different learning styles (e.g. flash animations, videos, audios, text, simulations, etc.) and they are interesting and appropriate in my study.	2.195046	1.32195
	ESQ4	UST Cloud Campus provides evaluation components and assessment materials (e.g. quizzes, assignments).	2.136223	1.380888
Support System Quality (SUP)	SUP1	UST Cloud Campus provides appropriate information about plagiarism issues when submitting assignments through the system.	2.287926	1.342362
	SUP2	UST Cloud Campus provides information about behavioral considerations when communicating with students or with instructors.	2.198142	1.260138
	SUP3	UST Cloud Campus provides information about the accessibility of content, permission for viewing course materials, and any other personal data in the system.	2.074303	1.309564

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	SUP4	If it is optional, I would still prefer to use UST Cloud Campus as a supportive tool in the module.	2.337461	1.358453
Learner Quality (LQ)	LQ1	I believe it is good to use UST Cloud Campus.	2.256966	1.360115
	LQ2	I have a positive attitude towards using UST Cloud Campus.	2.28483	1.30669
	LQ3	I am not intimidated by using UST Cloud Campus.	2.256966	1.320728
	LQ4	My previous experience with e-learning systems and computer applications helped me in using UST Cloud Campus.	2.287926	1.337726
	LQ5	I am able to perform tasks in UST Cloud Campus successfully.	2.256966	1.344037
Instructor Quality (INS)	INS1	I think an instructor's enthusiasm about using UST Cloud Campus stimulates my desire to learn.	2.383901	1.297868
	INS2	I receive a prompt response to questions and concerns from my instructors in UST Cloud Campus.	2.334365	1.287649
	INS3	I think communicating and interacting with instructors are important and valuable in UST Cloud Campus.	2.291022	1.372584
Perceived Satisfaction (SAT)	SAT1	I am satisfied with the performance of UST Cloud Campus.	2.297214	1.294359
	SAT2	I enjoy using UST Cloud Campus in my study.	2.365325	1.259611
	SAT3	UST Cloud Campus satisfies my educational needs.	2.287926	1.328408
	SAT4	Overall, I am pleased with the experience using UST Cloud Campus.	2.25387	1.267343
Perceived Usefulness (USF)	USF1	Using UST Cloud Campus enables me to accomplish my tasks more quickly.	2.368421	1.242565
	USF2	Using UST Cloud Campus improves my learning performance.	2.328173	1.240133
	USF3	Using UST Cloud Campus helps me learn effectively.	2.328173	1.242635
	USF4	Overall, UST Cloud Campus is useful.	2.287926	1.360744
System Use (USE)	USE1	I use UST Cloud Campus frequently.	2.47678	1.383774
	USE2	I depend on UST Cloud Campus in my study.	2.26935	1.282426
	USE3	I use UST Cloud Campus regularly.	2.297214	1.348415
	USE4	On average, I spend a long time on using UST Cloud Campus.	2.421053	1.276565
Benefits (BNFT)	BNFT1	Using UST Cloud Campus has increased my knowledge and helped me to be successful in the module.	2.303406	1.280851

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	BNFT2	UST Cloud Campus is a very effective educational tool and has helped me to improve my learning process.	2.219814	1.270048
	BNFT3	UST Cloud Campus makes communication easier with the instructor and other classmates.	2.297214	1.260321
	BNFT4	UST Cloud Campus saves my time in searching for materials and cuts down expenditures such as paper cost.	2.340557	1.354242
	BNFT5	UST Cloud Campus has helped me to achieve the leaning goals of the module.	2.23839	1.28373

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