Predicting satisfaction among the students on e-learning under the pandemic situation

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Abstract

With covid-19 pandemic, it is a challenge to continue the traditional learning system around the world. Hence almost all the educational institutes tends towards e-learning. However, this is still new to Sri Lankan educational institutes. Therefore, it is very important to study on the student's satisfaction for the new system. The purpose of this survey was to predict the satisfaction among the students on e-learning under the pandemic situation. Results of the study concludes that the fitted regression model was significant and can be used to predict e-learning satisfaction by gender, academic factors, psychological factors and physical resources availability factors. Results further reveals that females have higher e-learning satisfaction than males. Also there is positive relationship between Physical Resources Availability Score and E learning satisfaction.

Key Words: E-learning, Moodle, COVID 19

I. Introduction

We all know that whole world now is fighting with COVID-19 pandemic which originated in China in the late 2019 and widespread in all over the countries in the world in very short period of time. The COVID-19 pandemic has upended the lives of all people across the globe in many aspects including financial, economic and social. Also, the outbreak has changed the operating conditions all over the globe within a very short period of time. The COVID-19 declared as a pandemic by World Health Organization in 2020 has utterly disrupted educational activities, forcing most universities to a full closure, thus affecting hundreds of millions of students and educators across the globe [2]. The consequences of a pandemic are unstoppable and uncontrollable for many industries of the world. Later on, almost 120 countries have stopped face-to-face learning, approximately a billion students' education is effected worldwide with COVID-19 [2].

When traditional learning and teaching are no longer an option, online acts as an alternative to support the continuation of education in the midst of a pandemic with its flexibility, accessibility, and convenience. Most of higher institutions around the world shifted from face-to-face learning to emergency remote teaching and the motive behind such implementation was to alleviate the transmission of the coronavirus and maintain the continuation of education during the challenging times of lockdown among students and educators. Sri Lanka was also took same steps to continue the education through online platforms such as zoom. Almost all the Sri Lankan educational institutes including universities, schools, tuition class started the online education which is also known as e-learning. E-learning is covered under a larger term of technology-based learning through websites, learning portals, video conferencing, YouTube, mobile apps, and thousand types of free available websites for blended learning tools [2]

Currently, E-learning is enhancing students' knowledge, even the academic staff and professional

and industry people skills through the internet. Most of the higher education universities are providing online courses for their students within and of campuses. There are many advantages in e-learning as well as disadvantages. On the one hand, e learning makes students learning easy by saving time and money. It is very effective way of learning with new technology. However students are facing many challenges with e learning on the other hand due to various reasons including resources, less dace to face interactions etc… However, globally, due to COVID-19 outbreak universities closed and lockdown, most teachers and students are happy by the move online education. The faculty members of world renowned universities have begun to get online instructor certifications to deliver online teaching to their students. At the same time, faculty and staff members are learning how to use online learning platforms. Previous, they are using only the delivery through face-to face teaching. However, the shift to online mode has raised many queries on the quality of education [3]

Major objective of this paper is to predict the satisfaction among the students on e-learning under the pandemic situation. The rest of the paper is divided as follows. Review of Literature discusses the others work, Methods and Analysis section discusses methods that used in the analysis, also discusses about the derivations of new variables. In Experiment Results section we discuss the results before concluding the paper in the next section, finally discussion section will summarize and discuss about the findings and conclusions.

II. LITERATURE REVIEW

Many novel studies have been emerged recently on the same topic. This section briefly reviews related work in the literature. Arfan Shahzad et al (2021) [2] has done a study on effects of COVID-19 in E-learning on higher education institution students (the group comparison between male and female). Study result showed that information quality and system quality have direct relationships with user satisfaction for males while e-service quality and Information quality both are supported by system use and user satisfaction for females. This sample used for the study was based on students participated from the different universities in Malaysia. Study by Shadi A. Aljawarneh (2019) [4] have evaluated the use of various e learning tools including Wikipedia, MOODLE, Web 2.0, Web 3.0 and Blackboard. According to their results, MOODLE was found to be efficient in the development of e-learning. MOODLE was favored by a majority of authors and practitioners rather than Blackboard.

A study by Mohammed Amin Almaiah (2020) [5] explored the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. This study aims to explore the critical challenges that face the current e-learning systems and investigate the main factors that support the usage of e-learning system during COVID-19 pandemic. The findings of this study offer useful suggestions for policy-makers, designers, developers and researchers, which will enable them to get better acquainted with the key aspects of the e-learning system usage successfully during COVID-19 pandemic. Further, they founded that the critical factors that affect the usage of e-learning system and should universities take them into the future plans were: (1) technological factors, (2) e-learning system quality factors, (3) cultural aspects, (4) self-efficacy factors and (5) trust factors. In addition, the results indicated that there are three main challenges that impede the usage of e-learning system, namely, (1) change management issues, (2) e-learning system technical issues and (3) financial support issues. Study by MOHAMMED AMIN ALMAIAH (2019) [6] investigated the main determinants that could play an important role in increasing the usage and acceptance of e-learning systems among Saudi students. According to the results, design, course content support, course assessment and instructor characteristics were shown to have a significant effect on the actual use of e-learning systems. However, the influence of social influence on actual use was found to be statistically insignificant. Additionally, the course design, course content support, course assessment and instructor characteristics factors were found to have a positive effect on the performance expectancy of e-learning systems.

III. METHOD AND ANALYSIS

Questionnaire will be designed to collect all the relevant information regarding the research question. Questionnaire will have two sections. Demographic information section and e-learning information section. Demographic information section will be collecting relevant demographic information including gender, age, study location, education, institution, type of degree, etc… E-learning information section will have all the questions related to satisfaction level on e-learning. Some of the questions will be in likert scale.

Analysis section will have two sections. Descriptive analysis section and advanced analysis section.

Overview of the composition of the sample will be clearly described in descriptive analysis section. Basic descriptive statistics and graphs will be used to clearly visualize data and patterns. All the tests and relevant analysis related to the satisfaction among the students on e-learning will be done in advanced analysis section. Conbranch alpha will be used to assess the validity of the likert scale data collected. Questions related to satisfaction level on e-learning were categorized in to Academic Factors, Psychological factors and factors related to Physical Resources Availability. These factors were derivate as follows,

$$Academic\ Score = \frac{Total\ Score\ for\ Acedemic\ Factors}{Number\ of\ Related\ Questions}$$

$$Psychological\ Score = \frac{Total\ Score\ for\ Psychological\ Factors}{Number\ of\ Related\ Questions}$$

$$Physical\ Resources\ Availability\ Score = \frac{Total\ Score\ for\ Physical\ Resources\ Availability\ Factors}{Number\ of\ Related\ Questions}$$

Two sample independent t test was used to test overall satisfaction of e-learning between males and females. Pearson correlation coefficient was calculate to assess the linear relationship between the test overall satisfaction of e-learning and strength of internet connection. Multiple linear regression analysis was used to predict overall e-learning satisfaction score by using gender, academic score, psychological score and physical resources availability score. Interpretations of relationships were made using regression model coefficients. All the statistical tests were made using 0.05 as level of significance. Also the analysis was done using R (*4.0.1*).

IV. RESULTS

A. Descriptive Analysis

Table 1.1: Frequency table for demographic variables

Attribute	Category	Count	%
Gender			
	Male	147	42%
	Female	204	58%
Study Location			
	Home	305	87%
	Café	5	1%
	Friend's Home	11	3%
	Public Place	8	2%
	Relative's Home	22	6%
Mode of Internet Connection			
	Broadband	21	6%
	Mobile	38	11%
	Satellite	3	1%
	Wi-Fi Router	289	82%
Device			
	Desktop	18	5%
	Laptop	66	19%
	Tablet	196	56%
	Smartphone	71	20%
Study Hours (per day)			
	1-3 hours	59	17%
	3-5 hours	81	23%
	5-7 hours	192	55%
	10+ hours	19	5%
Overall E- Learning Satisfaction			
	Poor	60	17%
	Fair	73	21%
	Good	104	30%
	Very good	75	21%
	Excellent	39	11%

Descriptive summary table is presented in the table 1.1. Accordingly, most of the respondents in the sample are Females (58%). Most of the students are studying at their home (87%). However around 6% of the total students in the sample are studying from relatives home. Most of the student's mode of internet connection is Wi-Fi router (82%). Around 11% of the students use their mobile for internet connection. Most of the students in the sample study 5-7 hours per day on average (55%). Around 23% of the students study 3-5 hours per day on average. Only 5% of the students study more than 10 hours per day on average. Most of the students in the sample are satisfied with overall e-learning satisfaction (Good, Very Good, and Excellent) (62%).

B. Advanced Analysis

a. Reliability analysis

Table 2.1: Table for Cronbanch Alpha

Factor	Questions	Conbranch Alpha
Academic Factors	6	0.75
Psychological factors	3	0.796
Physical Resources Availability factors	2	0.703

Technically speaking, Cronbach's alpha is not a statistical test and it is a coefficient of reliability (or consistency). Cronbach's alpha statistic is widely used in the social sciences, business, nursing, and other disciplines. Theoretically, Cronbach's alpha results should give a number from 0 to 1 but can get negative numbers as well. A negative number indicates that something is wrong with data. However higher values of alpha are more desirable. Some professionals, as a rule of thumb, require a reliability of 0.70 or higher with 0.60 as the lowest acceptable threshold. Cronbach's alpha will generally increase as the inter-correlations among test items increase and is thus known as an internal consistency estimate of reliability of test scores. The table 2.1 shows the results of the reliability analysis in the study. Cronbach alpha of all measures are greater than minimum acceptable threshold value. Therefore, results show that all factors are highly reliable.

b. E-learning Satisfaction by gender

Table 3.1: Two sample t test results

Average E-Learning Satisfaction	
Males	Females
2.80	2.95

$t = -34.594$, $df = 458.15$, p-value $< 2.2e{-}16$

According to the results of table 3.1 as shown above, there is significant difference in E-learning satisfaction by Gender ($t(458.15) = -34.594$, $p < 0.05$). Results further shows that E-learning satisfaction by females are higher than E-learning satisfaction by Males.

c. Correlation Analysis

Table 4.1: Correlation table

Factor	Overall satisfaction	P Value
Overall satisfaction	1	
Academic score	-0.031	0.5601
Psychological Score	0.003	0.9627
Physical Resources Availability Score	0.273 *	2.09E-07

* significant at 0.05 sig. level

According to the table 4.1, there is week positive linear relationship between overall satisfaction and physical resources availability score. Also, this correlation is significant at 0.05 level of significance ($p < .05$). This means, when increase in Physical Resources Availability Score results to slight increase in overall satisfaction on E-learning by the students

d. Predicting E-Learning satisfaction.

Table 5.1: Regression summary table

Residual standard error	1.187
DF	346
Multiple R-squared	0.09602
Adjusted R-squared	0.08557
F-statistic (4, 346)	9.188
P-value	4.59E-07

Table 5.2: Table of regression model coefficients

	Estimate	Std. Error	t value	Pr(>|t|)	95 % CI
(Intercept)	2.35787	0.36096	6.532	2.3E-10	(1.648,3.068)
Gender	-0.35312	0.1469	-2.404	0.0167	(-0.642,-0.064)
Academic score	-0.02767	0.09276	-0.298	0.7657	(-0.21,0.155)
Psychological Score	-0.0271	0.0961	-0.282	0.7781	(-0.216,0.162)
Physical Resources Availability Score	0.45649	0.07765	5.879	9.7E-09	(0.304,0.609)

According to the regression analysis summary results table, fitted regression model is significant at 0.05 level of significance ($F(4, 346) = 9.188$, $p < .05$). Specifically speaking, p value indicates that at least one regression coefficient is significant at 0.05 level of significance. Hence fitted regression model can be used to predict E-learning satisfaction of the undergraduate students in Sri Lanka by their gender, academic score, psychological score and physical resources availability score. Further model diagnostic measures indicates that approximately around 9% of the total variability of the e-learning satisfaction of the students can be explained by the considered predictors in the model. However this is not that much satisfactory.

Only variables gender and Physical Resources Availability Score seems significant in the model ($p < .05$) while Academic score and Psychological Score are not significant ($p > .05$). E learning satisfaction score for the males is 0.35312 less than E learning satisfaction score for the females (*95% confidence interval is (0.064, 0.642)*). E learning satisfaction score increased by 0.46 on average when Physical Resources Availability Score increased by 1 unit (*95% confidence interval is (0.304, 0.609)*). This concludes that there is positive relationship between Physical Resources Availability Score and E learning satisfaction.

V. SUMMARY AND DISCUSSION

The purpose of this survey was to predict the satisfaction among the students on e-learning under the pandemic situation. Regression model was used for this purpose and the results concludes that the fitted regression model was significant and can be used to predict e-learning satisfaction by gender, academic factors, psychological factors and physical resources availability factors. Results further reveals that females have higher e-learning satisfaction than males. Also there is positive relationship between Physical Resources Availability Score and E learning satisfaction. Therefore it is very important to take necessary measures to increase e-learning satisfaction for males. Also need to ensure strong internet connection for the undergraduate students to enjoy remote learning. Ensuring suitable peaceful and calm environment for them to learn is also a very important point. Taking action to full fill these factors would increase the satisfaction towards e-leaning by the undergraduate students in Sri Lanka.

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Git Repo Link -
https://github.com/Ishan40/e_learning_project