Analysis of Satisfaction of E-Learning of Undergraduate Students in Sri Lanka within Pandemic

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I. Abstract

Due to the sudden spread of the pandemic situation, most learning education-related institutions including schools had to be closed in order to prevent the spread. As a result of that, the conventional education system was practical enough to perform. Therefore, people tend to adhere to distance learning with e-learning facilities. Even this method needs some specific tools which were not needed for the conventional face-to-face learning method, people quickly adapted to these new tools. Even though the e-learning method is not a brand-new method, it is still not mature enough to perform all kinds of learning tasks. Still, some people struggle to adapt this way. This analysis is to measure this by measuring the satisfaction of e-learning on undergraduate students.

II. Introduction

E-learning is not a new topic to the world, and this was existing way before the pandemic situation. People were trying this method to save time due to its flexibility and easiness.

E-learning is basically provided the facility to learn from a distance and the communication will be done through the internet. Compared to face-to-face learning in the class, one of the prominent advantages is that any student can participate in the class no matter where they are. This will reduce the traveling time as well.

One most prominent drawback is that in order to perform e-learning properly, students must have a proper internet connection.

With the sudden spread of the covid-19 pandemic, all education-related sectors, as well as other sections, have been locked down into the home. Due to this reason, especially, the education sector has started learning through distance education via e-learning [1].

This was affected equally to educational institutions in Sri Lanka as well. At this stage, Sri Lanka was not prepared or not mature enough to serve e-learning properly compared to other countries due to technical difficulties, demographic and geographic reasons, and some other reasons. As a result of that, some of the students might not satisfied with the e-learning facility even though it has various advantages.

So, the main objective of this research is to observe and analyze the satisfaction of students. Here the observed population has been narrowed down to undergraduate students in Sri Lanka for the sake of easiness of data collection.

III. Method

This research followed the same common methods which were used in [2].

A. Selection of Problem

The problem is to measure the satisfaction of undergraduate students for e-learning within the pandemic situation. The reason to select this problem is that this is a very major problem in current days. Finding a proper answer is very helpful to society.

B. Literature Study

Studied some previous literature studies which were done on this or somewhat similar problems that are done on other countries.

Category	Question	Answering Option
Demographic	In which province you live currently?	Selection
	Your age belongs to which group?	Selection
	What is your gender?	Selection
	What is your university?	Enter Manually
	Are you working right now?	Selection
Measurement Factors	Comfortability of conversation via text based medium	Selection (Likert Scale)
	Comfortability of using LMS	Selection (Likert Scale)
	Communication between class and me	Selection (Likert Scale)
	Clarity of the lecture slides and voice compared to face-to-face lectures.	Selection (Likert Scale)
	Comfortability of participating classes	Selection (Likert Scale)
	Effectiveness of e-learning	Selection (Likert Scale)
Overall Experience	I like the flexibility of e-learning than physical lectures.	Selection (Likert Scale)
	E-learning worth my time	Selection (Likert Scale)
	I prefer e-learning	Selection (Likert Scale)
	I look forward to learning with e-learning	Selection (Likert Scale)
	I'm more satisfied with e-learning compared face-to-face lectures.	Selection (Likert Scale)
	I recommend e-learning to other students.	Selection (Likert Scale)

Table 1 Questions in the survey

C. Data Collection

Since the face-to-face or physical data collection methods are impractical or hard these days due to various quarantine lows and policies, selected the online form which can be sent through social media platforms and emails as the data collection method. The form was created using Google Forms and shared with undergraduate students and collected the data [3].

D. Pre-Processing

For this dataset, there was not much preprocessing effort was taken. Especially all questions in the survey were mandatory. There was no need of handling any missing values. Furthermore, most of the questions were Likert scale-based questions. One question which the participant had to enter manually was the name of the university which they are currently in. This university name was not uniquely identifiable since the same university name was written in different forms. For example, the University of Moratuwa was written in UOM as well. Due to this reason, there was a preprocessing step followed to make them uniform.

E. Data Analysis

Data analysis was performed after collecting the dataset from an online questionnaire. Initial descriptive analysis was done using Microsoft excel and further analysis was conducted through the JASP [4] application.

IV. Results and Discussion

There were 17 questions in the survey with a variety of answering options including Selection, manually entering, and Selection with Likert scale. The Likert scale consists of 5 levels and the lowest score is 1 while the maximum possible score is 5.

A. Demographic and Geographic Questions

Following is the distribution of the geographical location of participants.

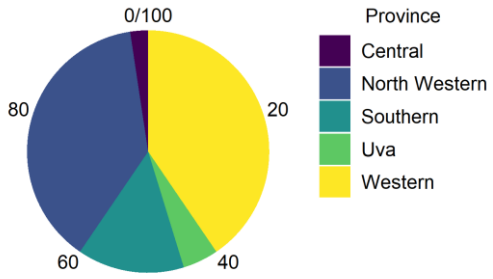

Figure 1 Participant distribution by province

According to the descriptive data in Figure 1, most of the participants are from Western Province and Northwestern Province.

Considering the gender distribution of participants,

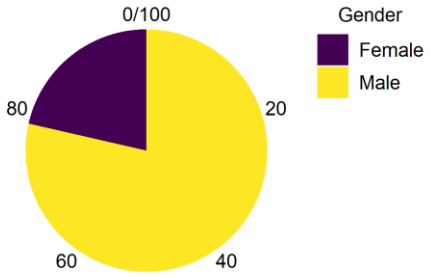

Figure 2 Gender distribution of participants

Based on gender distribution, around 80% of participants were Male while only 20% were Females.

The next consideration is the age of the participants. In this survey, age was considered as the age group. Since this is considering only the undergraduate students, the following age groups were taken into account.

- 18 – 20
- 21 – 23
- 24 – 26
- 27 or grater

Based on the observations, there were no responses that belong to the "27 or greater" group. Following is the distribution of responses.

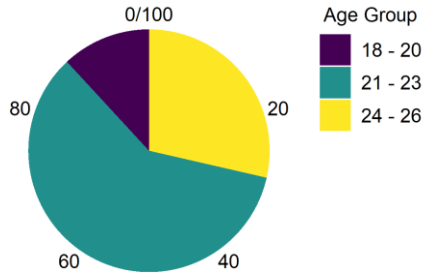

Figure 3 Age distribution

Employment status is one of another measurement that was considered in this questionnaire. This question provided a Yes/No option and based on the responses; the majority of participants responded as "No". The following diagram depicts the responses.

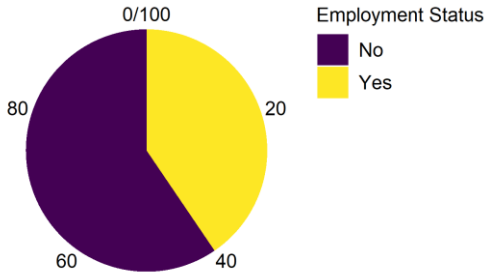

Figure 4 Employment Status Distribution

B. Likert Scale Questions

There were 12 Likert scale-based questions in the questionnaire and each of them measured some factors to measure satisfaction.

Figure 5 Effectiveness of e-learning

The above figure describes the scores for the question "Effective of e-learning". According to figure 5, the majority of votes went to "Good". One of another major observations here is that there was not any vote given for "Bad" and "Worst".

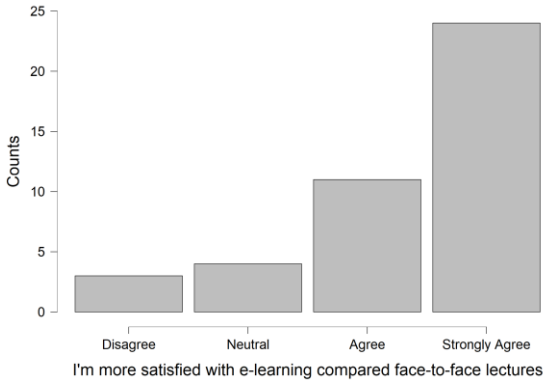

Figure 6 Satisfaction compared to face-to-face lectures

This question was measuring the overall satisfaction of e-learning compared to face-to-face in-class physical lectures. According to the observations in

In the above image, the majority of students voted as “Strongly Agree”.

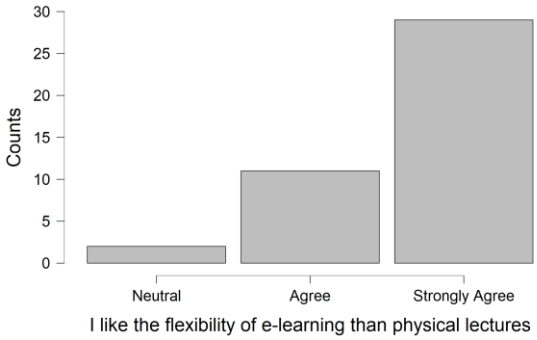

Figure 7 Likeliness for flexibility of e-learning

The above figure shows how students agree with the flexibility of e-learning compared to face-to-face in-class learning. Considering the observations, the majority of votes went into “Agree” and “Strongly Agree”.

C. Statistical Tests

Based on the above definition, the null hypothesis (H_0) was selected as 4 where the expected mean score was “Agree”. The alternative hypothesis (H_1) was selected as greater than 4 where the mean score should be greater than “Agree”.

Based on the alternative hypothesis, this test is a one-tailed t-test. Specifically, a right-tailed one-sample t-test. The sample size was 42 and so the degree of freedom (df) was 41. Student t distribution was selected for the test and the calculated t value was 2.327. The sample mean value was 4.333. 95% confidence interval was used for this t-test and so significant value (alpha) was 0.05. According to the test results, the p-value was 0.012 which is less than the alpha value. So according to this t-test, there is evidence to reject the null hypothesis (H_0).

The conclusion is that it is 95% confident that the mean satisfaction score is greater than 4 which is “Agree”.

					95% CI for Sample Mean	
	t	df	p	Sample Mean	Lower	Upper
I'm more satisfied with e-learning compared face-to-face lectures	2.327	41	0.012	4.333	4.092	∞

Note. For the Student t-test, location estimate is given by the sample mean *d* .
Note. For the Student t-test, the alternative hypothesis specifies that the mean is greater than 4.
Note. Student's t-test.

Table 3 One sample t-test for satisfaction of e-learning compared to face-to-face lectures

Descriptives

	N	Mean	SD	SE
I'm more satisfied with e-learning compared face-to-face lectures	42	4.333	0.928	0.143

Table 2 Descriptive stats of satisfaction of e-learning compared to face-to-face lectures

A one-sample t-test [5] was performed for the observations of the question “I’m more satisfied with e-learning compared to face-to-face lectures”. The question consisted of 5 score levels from 1 to 5. The relevant definition for each score is as follows.

- 5 - Strongly Agree
- 4 - Agree
- 3 - Neutral
- 2 - Disagree
- 1 - Strongly Disagree

The next statistical test is also a t-test but with independent two samples. There two observations from two questions were selected for the test. Selected questions were “I like the flexibility of e-learning than physical lectures” and “Employment Status” of the participants. This test was performed in order to find whether there is a relation between the likeliness of flexibility of e-learning to the employment status of students. Because in general, employed students are comparatively busier than

Independent Samples T-Test

	t	df	p
I like the flexibility of e-learning than physical lectures	-2.336	40	0.012

Note. For all tests, the alternative hypothesis specifies that group *No* is less than group *Yes* .
Note. Student's t-test.

Table 6 Independent sample t-test for likelihood of flexibility vs employment status

Group Descriptives

	Group	N	Mean	SD	SE
I like the flexibility of e-learning than physical lectures	No	25	4.480	0.653	0.131
	Yes	17	4.882	0.332	0.081

Table 4 Independent sample t-test descriptives

Contingency Tables

	Comfortability of participating classes				
Province	**Bad**	**Fair**	**Good**	**Excellent**	**Total**
Central	0	0	1	0	1
North Western	0	0	8	8	16
Southern	0	1	2	3	6
Uva	2	0	0	0	2
Western	0	2	10	5	17
Total	2	3	21	16	42

Table 5 Contingency table for comfortability of participation vs geographical location

unemployed students and so employed students are likely to go with the flexible learning.

The first question is a Likert scale question with a 1 to 5 scale. The second question is the “Yes/No” question. The test was based on student t distribution and the degree of freedom was selected as 40. Null hypothesis (H_0) was selected as the number of unemployed students who like the flexibility of e-learning is equal to the number of employed students who like the flexibility of e-learning. The alternative hypothesis (H_1) was selected as the number of unemployed students who like the flexibility of e-learning is less than the number of employed students who like the flexibility of e-learning. This is a one-tailed t-test.

For the test, a 95% confidence interval was selected and so the significant value (alpha) was 0.05. The calculated p-value was 0.012. Therefore, the p-value is less than the alpha significant value. So, there is clear evidence to reject the null hypothesis of this test.

In a conclusion, it is 95% confident that the number of unemployed students who like the flexibility of e-learning is less than the number of employed students who like the flexibility of e-learning. Therefore, there is a relationship between employment status and the likeliness of flexibility of e-learning. Employed students prefer e-learning more than unemployed students.

V. Conclusion

As expected, this survey was able to collect information from undergraduate students from various geographic locations, universities as well as various age ranges. Based on the observations from descriptive analysis, taken from Likert scale questions, the majority of voters have supported e-learning.

Furthermore, there were some statistical analyses were performed in order to determine the effectiveness and satisfaction of e-learning. The conclusion of those hypothesis tests also provided evidence that overall, students were satisfied with e-learning. According to the contingency table for the

geographical province and the comfortability of participating classes give some kind of evidence where students from rural areas have some kind of difficulties with e-learning. So as a proposal of this study, improving the network connectivity in rural areas as well as providing required hardware devices can be suggested.

The dataset which was collected by this study is publicly available [6].

VI. Future Works

The following points will be helpful future works to fill some of the gaps in this study.

- This study was aimed only the undergraduate students which is a very small population compared to the whole student population. Extending this study to target a larger population might give more interesting findings.
- Furthermore, this study can help to improve the e-learning process in Sri Lanka. For that purpose, this study was considered only from the perspective of students. But if another study that can focus on the perspective of lecturers might also help the study.

VII. References

[1] W. Elshami, M. H. Taha, M. Abuzaid, C. Saravanan, S. Al Kawas, and M. E. Abdalla, "Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges," *Med. Educ. Online*, vol. 26, no. 1, 2021, doi: 10.1080/10872981.2021.1920090.

[2] T. A. Prasetya, C. T. Harjanto, and A. Setiyawan, "Analysis of student satisfaction of e-learning using the end-user computing satisfaction method during the Covid-19 pandemic," *J. Phys. Conf. Ser.*, vol. 1700, no. 1, 2020, doi: 10.1088/1742-6596/1700/1/012012.

[3] G. Banerjee, "Blended environments: Learning effectiveness and student satisfaction at a small college in transition," *J. Asynchronous Learn. Netw.*, vol. 15, no. 1, pp. 8–19, Feb. 2011, doi: 10.24059/olj.v15i1.190.

[4] M. A. Goss-Sampson, "Statistical analysis in JASP: a guide for students," *JASP*, Sep. 2019, doi: 10.6084/M9.FIGSHARE.9980744.

[5] M. T. Cole, D. J. Shelley, and L. B. Swartz, "Online instruction, e-learning, and student satisfaction: A three year study," *Int. Rev. Res. Open Distance Learn.*, vol. 15, no. 6, pp. 111–131, 2014, doi: 10.19173/irrodl.v15i6.1748.

[6] "student-satisfaction-study/questionnaire dataset.csv at main · n256Coding/student-satisfaction-study." https://github.com/n256Coding/student-satisfaction-study/blob/main/questionnaire dataset.csv (accessed Dec. 13, 2021).