Analysis of Students Viewpoint on Distance Learning in Mathematics (Science) Program, Universiti Teknologi Malaysia

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Abstract

The COVID-19 epidemic has spread over the world and has had a significant impact on education system in Malaysia. As result, learning methods were delivered through online learning halfway through the second semester of the academic year 2019/2020. This paper aims to evaluate the students' viewpoint on distance learning compare to classroom learning and to find the best possible model to understand the challenges that has been faced by the students during distance learning. Two statistical analyses have been performed in this research study to achieve the aims for this paper which are factor analysis and logistic regression analysis. In this study, we used data from the survey that we have given to the third year and fourth year of undergraduate mathematics students in Universiti Teknologi Malaysia with a population of 280 students. The findings of this study show that we managed to determine whether the students could adapt with the new method of learning with the challenges that they have been facing and this research outcomes can also be used by the lecturers to understand the student's problem and improve their way of teaching during distance learning.
Keywords: distance learning; classroom learning; logistic regression; factor analysis; exploratory factor analysis

1. Introduction

A novel corona virus identified as Covid-19 was detected in a seafood market in Wuhan in the last month of 2019 [1]. A novel corona virus infection, also known as COVID-19, has become the most recent pandemic to strike the entire planet. Malaysia got their first confirmed case on January 25, 2020, and the first confirmed death on March 17, 2020, after it was initially described in China in December 2019. It had only been one day since the country had been placed under a stringent movement restriction order (MRO). By forcing all institutions to relocate to online platforms, the pandemic has forced the physical closure of companies, sports activities, and schools around the world. Therefore, learning institutions have been obliged to put a temporary halt to their academic calendars as a result of the circumstance. It should be highlighted that since the virus's outbreak, everything has been altered where teaching and learning practises have now moved into the house. All classes were moved online to allow these kids to continue their education, and millions of students have begun to learn using the internet and digital tools.

To begin, students must have access to technology as a fundamental sign of their preparation for online learning [2]. Since students are doing their learning on their own, lecturers may need extra time to create successful material delivery because students will be certainly having difficulties to adapt with the new way of learning. Certain levels of education are torn between adhering to the law and immediately welcoming internet study due to the COVID-19. Top management in Universiti Teknologi Malaysia (UTM) has decided to finish its academic cycle by moving it's teaching-learning to the online learning method. Online learning is the use of the internet and other essential technologies to create educational resources, deliver teaching, and manage a program [3]. There are two types of online learning with asynchronous and synchronous online learning, both approaches are heavily compared, but academic staff, and top management of the institutions must have a thorough awareness of the benefits and limitations for online learning to be effective and efficient [4].

Therefore, the propose of the study is to look at the students viewpoints about online learning versus traditional classroom learning in the undergraduates' mathematic study program in UTM. At the end of the semester, undergraduate of mathematics students received an online questionnaire and we expected that students will respond well to distant learning as a new learning technique applied during the COVID-19 epidemic.

This study focused on the perspectives of the 3rd and 4th year undergraduate's mathematics study program to ensure that they could adapt well with the distance learning method. Thus, an online questionnaire was distributed to the students regarding the students' viewpoints on distance learning during COVID-19 and we used Cronbach's alpha to determine the internal consistency reliability of the questionnaire. Then, to find parameters linked to students' desire for distance learning, we used logistic regression analyses. The statistical significance level was set at 0.05. We also performed Explanatory Factor Analysis (EFA) in this study based on the data from the questionnaire.

2. Literature Review
2.1   Distance Learning in Malaysia
Malaysia's higher education, like that of other countries, experienced numerous obstacles during the Covid-19 pandemic. During the mid-semester break of undergraduate programme and the ongoing second semester of pre-university programme in Malaysia, the global pandemic has impeded learning institutions [5]. Distance learning, also known as distance education, e-learning, mobile learning, or online learning, is a type of education in which teachers and students are separated physically during the instruction and learning process [6]. Faculty teaching in a classroom setting, students listening, taking notes, asking questions, and receiving answers have been the backbone of traditional academic education since the dawn of time [7]. New ways of learning, such as distant learning, have emerged as a result of developments in communication technologies such as the telephone, radio, television, and, most recently, the internet [8]. Students can now receive instruction and study at home with ease by simply pressing a few buttons on their computer to listen to a professor hundreds of miles away, engage with the professor, and answer problems without having to physically be in a classroom [7]. Adapting to the new normal, on the other hand, is not an easy task. Higher education institutions around the country must annul in-class teaching practices in accordance to the MCO. To facilitate teacher-student connection, they must implement online electronic communication tools.

2.2   Logistic Regression
Logistic regression is a statistical model that uses a logistic function to represent a binary dependent variable in its most basic form, though there are many more advanced variants. Logistic regression is a type of regression analysis. By estimating probabilities with a logistic function, which is the logistic distribution's cumulative distribution function, logistic regression examines the relationship between a categorical dependent variable and one or more independent variables. As a result, it employs approaches similar to probit regression to address the same set of issues, while the latter use a cumulative normal distribution curve. In the latent variable interpretations of these two approaches, the first assumes a standard logistic distribution of errors, while the second assumes a standard normal distribution of errors [9].

2.3   Exploratory Factor Analysis (EFA)
In the social sciences, exploratory factor analysis (EFA) is a frequently used and widely implemented statistical technique. Researchers in the social sciences have access to a wide range of statistical tools for performing theoretically, empirically, and/or practically relevant research. An example of such a tool is EFA. Unlike confirmatory factor analysis (CFA) which used to evaluate theories regarding underlying latent processes at a later stage in the research process. With or without underlying theoretical processes in mind, the goal of EFA is to find the smallest number of interpretable factors required to explain the correlations among the observable variables [10]. EFA is thus a way for

determining the factor structure of a collection of many indicators or variables without imposing an a priori structure on the factors [11].

3. Methodology
3.1   Population and Samplings
This study was performed on March 2022 to June 2022.Study participants were the third and fourth year students of mathematics study program with a total number of 280 students at Faculty of Science in Universiti Teknologi Malaysia (UTM). The online questionnaires were given to the participants after the opening of a new semester.

3.2   Data Collection Procedures
The questionnaire was adopted from [12]. The questionnaire consisted of 4 parts. The first part consisted of questions on the preference of the students towards distance learning. The second part consisted of questions regarding the effectiveness of the distance learning. The last section will cover about the learning satisfactions towards distance learning. The respondents will be asked to state their agreement and disagreement on a 5-point Likert scale with I =strongly disagree to 5=strongly agree for the factor domain question and a 4-point Likert scale with 1=strongly disagree to 4=strongly agree for the preference, effectiveness and learning satisfaction domain question. As for the last part, the questions were about the challenges that had been faced by the students during distance learning.

3.3   Statistical Analyses
Cronbach's alpha was used to assess the internal consistency reliability of the questionnaire. Bivariate analyses were done after descriptive statistics were generated. To discover parameters linked to students' desire for distant learning, logistic regression analyses were used. The statistical significance level was set at 0.05.

4. Results and Discussions
4.1   Demographic Analysis

Table 1 General information of respondents

Variables	N (%)	Mean	Standard Deviation
Year of Study			
2018/2019	136(48.6)	1.51	0.501
2019/2020	144(51.4)		
Courses			
SSCE	148(52.9)	1.47	0.500
SSCM	132(47.1)		
Gender			
Male	89(31.8)	1.68	0.466
Female	191(68.2)		
GPA			
>3.5	151(53.9)	1.46	0.499
<3.5	129(46.1)		

Table 1 above shows the statistics for our respondent's general information that participated in this survey. According to the demographic data in this study, there are 136 (48.6%) fourth year and 144 (51.4%) third year of mathematics students that responded to the questionnaire. The majority of responders were from SSCE courses with 148(52.9) followed by SSCM with a frequency of 132(47.1). Results also show that 89(31.8) were from the male respondents and 191(68.2) for the female respondents. According to the findings, respondents who managed to achieve GPA greater than 3.5 are 151(53.9) during distance learning examination. Meanwhile, only 129(46.1) respondents that their GPA below than 3.5.
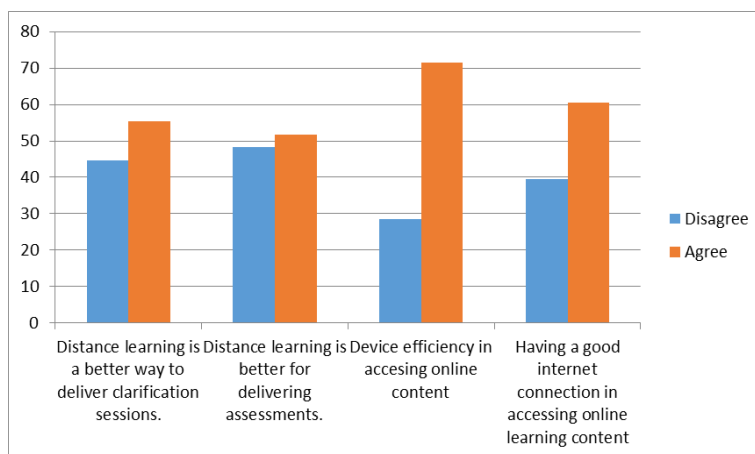

Figure 1   Preference Domain data

4.1.1 Preference Domain

The findings that we can conclude from the preference domain data in Figure 1 that the item 3 has the highest mean with score of 2.81 ± 0.731. Majority of the students (55.4%) and (51.8%) preferred distance learning to deliver clarification sessions and delivering assessments. As for the device efficiency and having good internet connection variables, 28.5% and 39.6% of them seems to be disagree with the statements. A lot of assumptions can be made to support the disagreement such as some of the students cannot afford to own their own laptop and some of the students come from rural areas making them having a bad internet connection.
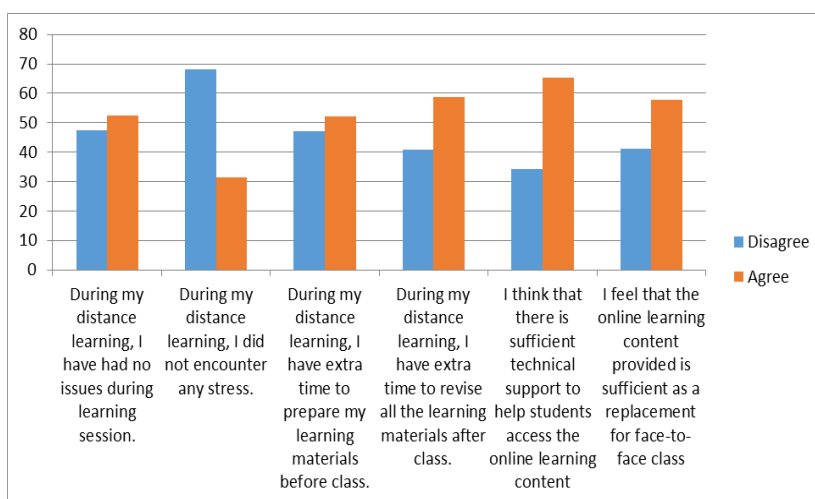

Figure 2   Effectiveness Domain Data

4.1.2 Effectiveness Domain

Distance learning gave students the impression of having extra learning time, despite the fact that there were still technical limits based on Figure 2. There are only 52.5% of the students did not encounter any problems during distance learning. The majority of the problems during remote learning were described as external reasons, such as an inconsistent internet connection and an

additional financial load for internet quota, according to data from open inquiries about the obstacles. Other internal issues included student preparation for the new learning approach, time management, and difficulty focusing when learning for lengthy periods of time on the computer. These are also might be the reasons for the 68.2% of students who were having stress during distance learning.
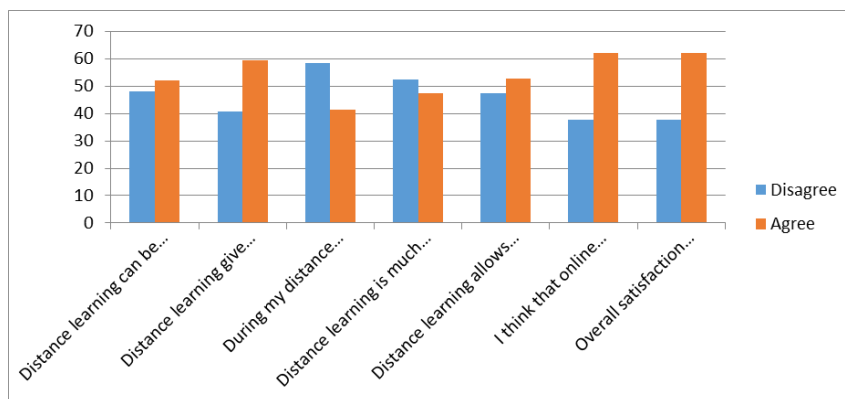

Figure 3   Learning Satisfaction Data

4.1.3 Learning Satisfaction Domain

Based on the results in Figure 3, we indicate that 62.1% of the students preferred the method of online examination which has been implemented by the university. One of the reasons that can support this statement is that students were able to have a choice to check on their notes during examination which it helped a lot of students to improve their GPA for every semester.

4.2 Reliability Test

Table 2 below show the outcome values of Cronbach's alpha for our study. Based on the results of the Cronbach's alpha results from Table 2 below, the outcome values of the Cronbach's alpha for each domain of questions ranges at 0.756 to 0.905 which indicates a good reliability of data. Thus, the data that we obtained from survey can be used for further analyses since the Cronbach's alpha values for each domain of questions deemed to be reliable.

Table 2   Cronbach's alpha

No	Variables	Cronbach's Alpha	No of items	No of respondents
1	Preference Domain	0.756	4	280
2	Effectiveness Domain	0.799	6	280
3	Learning Satisfaction Domain	0.916	8	280
4	Factors Domain	0.905	11	280

4.3 Logistic Regression

From the Table 3, we used α=0.05 to measure the significance of each variables to make sure that we obtained significance value in our analysis. Out of 17 variables listed as independent variables in this analysis, 5 variables were found to be having significance value.

Table 3   Variables related to the student's preference towards distance learning

	Exp(B)	95% CL(B)	*p*-value
1) Distance learning is better for delivering assessments.	1.071	0.709-1.620	0.013
2) I feel that the online learning content provided is sufficient as a replacement for face-to-face class	0.571	0.390-0.838	0.004
3) During my distance learning, I did not encounter any	0.590	0.404-0.862	0.006

stress.			
4)I feel that the online learning content provided is sufficient as a replacement for face-to-face class	0.571	0.390-0.838	0.004
5) Distance learning can be proceed to the next semester	0.526	0.366-0.756	<0.001

From Table 4.3, these confidence intervals (CI) are numerical ranges that are most likely to include the genuine odds ratio values. The normal distribution is used to calculate the confidence intervals. If the sample size is high enough, the distribution of the sample odds ratios follows a normal distribution, the confidence interval is accurate. Exp(B) in the Table 4.3 indicate the value of odd ratio for each variable. Odds ratios larger than one suggest that as the predictor grows, the event is more likely to occur. As the predictor grows, odds ratios less than one suggest that the event is less likely to occur. Overall, variable "having good internet connection" has the highest odd ratio in relation to student's preference towards distance learning which at 1.412. There, we can conclude that for every one person increase in having good internet connection during distance learning, the likelihood that student will prefer distance learning compare to classroom learning increases approximately at the value of 1.412.

Then, we compare the *p*-value for each term in the model with the significance threshold to evaluate whether the relationship between student's preference towards distance learning compare to classroom learning with the challenges that the might be faced during distance learning variables is statistically significant. The null hypothesis is that the term's coefficient is equal to zero, indicating that the independent variables that we have chosen and the dependent variable have no relationship. A significance level (or alpha) of 0.05 works nicely most of the time. With a significance level of 0.05, there's a 5% chance of determining that an association exists when there isn't one. From the Table 4.3, we used value of α=0.05 to measure the significance of each variables to make sure that we obtained significance value in our analysis. Thus, out of 17 variables listed as independent variables in this analysis, 5 variables were found to be having significance value which the *p*-value is less than 0.1. As stated in Table 4.3, the *p*-value of the second variable is 0.013, fourth, sixth variable is 0.006, tenth variable is 0.004, eleventh variable is less than 0.001 and fourteenth variable is at 0.095. These 5 variables that have been found to be having significance value were categorized into four scores which are strongly disagree coded as '1', disagree coded as '2', agree coded as '3' and strongly agree coded as '4'. Therefore, the results indicate that the association between these 5 variables and student's preference towards distance learning is statistically significant.

5. Conclusions

The COVID-19 epidemic has spread over the world and has had a significant impact on schooling. As a result, learning methods were supplied through remote learning halfway through the second semester of the academic year 2019/2020. The study showed that, despite certain problems, undergraduate mathematics students were able to adjust to new remote learning methods and agreed that distance learning was more efficient than classroom learning. Although the unexpected shutdown of universities in Malaysia due to the COVID-19 pandemic is unwelcome, it does give a huge opportunity for Cultural Revolution in the education sector. Mathematics educators must include blended learning into the curriculum, designing the best elements of classroom and online learning to improve the overall learning environment as more "tech-savvy" generations enrol in higher education.

During the course of doing this study, a constraint was discovered. The limitation serves its own purpose in that it is extremely valuable for future research and studies in terms of obtaining higher frequencies in terms of accuracy in their findings by removing all of the limitations that have been a tiny barrier to this topic's concern. The sampling procedure was determined to be one of the study's weaknesses. A big sample size could also influence a good result that we could obtained from the analysis of logistic regression and factor analysis.

These findings emphasize immediate need for improvement of distance learning system in Malaysia since cases like this might happen again one day where the students need to shift the classroom learning method into distance learning method. In addition, we are already in the era where

we have advanced technology. Thus, it is not possible for the students to blended learning method where it will consist of distance and classroom learning method. Last but not least, the results of this study mostly not statistically significant due to some reasons. The major factor was insufficient amount of sample size, and as for future study it is advisable that it should have larger amount of sample. This will help the study to obtain more accurate and significant variables or values.

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