INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 11, Issue 2, (2022) E-ISSN: 2226-6348

The Influences of Online Learning Factors on Open Distance Learning Satisfaction in Mathematics by Using Logistic Regression Analysis

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To Link this Article: http://dx.doi.org/10.6007/IJARPED/v11-i2/14335 DOI:10.6007/IJARPED/v11-i2/14335

Published Online: 16 June 2022

Abstract

Since the Coronavirus (COVID-19) outbreak in 2019, Open Distance Learning (ODL) has been implementing as an alternative learning method in the whole education system. In this study, we want to identify the online learning factors that influence on Open Distance Learning Satisfaction in Mathematics. Three faculties in UiTM Tapah consists of 336 students participated in this. A set of questionnaire are distributed among them and shared via Whatsapp or Telegram application to reduce contact due to COVID-19 standard operating procedure (SOP). Five main learning factors are being identified which are Online Learning Readiness, Self-Directed Learning, Technologies, Internet and Tools, Skills and Acceptance, and Motivation for Learning. The data collected is then analyzed using a Logistic Regression analysis to achieve the objective of this study.

Keywords: Covid-19, Logistic Regression Analysis, Open and Distance Learning (ODL), Student Satisfaction, Online Learning.

Introduction

Since the COVID-19 outbreak, universities in the whole world begin to find alternatives way for the teaching and learning process. Some university prefers fully online courses, while other are implementing the hybrid method by combining face-to-face class and online class and only least with fully face-to-face classes as needed by the health department. Dhawan et. al (2020) wrote that all educational units are struggling to find options to deal with this challenging situation.

Mathematics is considered one of the most challenging subjects and most student struggle to study mathematics especially through ODL. Online learning makes student's participation or interaction with classmate more flexible. Lecturer will provide materials for learning process such as recorded video or online video. Student then will learn either from the materials provided by their lecturer or maybe they can search their own materials via Google, Youtube, MOOC or any other sources. ODL mode required a student centered learning process with

lecturer only as facilitator to help. Some university might already implement e-learning or blended learning process but not for all courses especially mathematics.

This study aims to identify the online learning factors that influence on Open Distance Learning Satisfaction in Mathematics. The data was collected from diploma students at UiTM Tapah. Satisfaction levels among student should be taken into consideration in designing online courses and building online environments to ensure students with an effective learning environment. The findings of this research contribute to the existing knowledge through new insights into determining factor that influence students' satisfaction in mathematics courses through open distance learning approach

Literature Review

During the COVID-19 outbreak, Open Distance Learning (ODL) became the only tools for lecturer to deliver lecture to their students. ODL took the place of traditional classrooms and created new chances for lecturers and students to interact and communicate (Shanti, 2021). This also support by (Mphalele, 2021) who identifies ODL as an excellent tools to deliver information by integrating lecturer needs, students engagements and at the same time course must address strategies to address the barriers between both parties. In addition, as times goes by, lots of free applications are available to help both parties in ODL whereas some of it are already there for such a long time. Here, the selection of appropriate tools is vital in order to ensure that no student is left behind as well as to make sure the teaching and learning process a success (Saidi, 2021).

Learning Mathematics require students to have a capability of problem solving. Conventional method of teaching mostly are chalk and talks where lecturer explain the topics and students do lots of exercise to make them familiar with the most kind of possible questions. However, during pandemic of COVID-19, Mathematics' learning styles change completely at all education level. Learning Mathematics through ODL somehow quiet difficult for some students where there are expect to be more proactive and more independent (Amiruddin, 2022). This also support by (Kalfopoulou, 2022) in their research where teachers in Greece are expected to be ready to teach students via e-learning process thoroughly. Experiences teachers will be prepared technically, the subject must follow the teaching objectives yet covered the entire curriculum needed and also the needs of interaction between teachers and students (Kalfopoulou, 2022). These show that, lecturers or teachers must be ready mentally and physically in teaching Mathematic during pandemic, endemic and for all times.

Azhar et. al (2021) identified several factors lead to student satisfaction level during ODL Mathematics courses which are Online Learning Readiness, Self-Directed Learning, Technologies, Internet and Tools, Skills and Acceptance, and Motivation for Learning. Adewoyin et. al (2022) in their research also identify that students prefer web based learning or ODL learning where they can learn independently anytime but with a support of internet, tools and also skills needed being provided for them beforehand. In addition, a good internet coverage or line will comes in handy to provide students satisfaction and help to motivate them in ODL process (Datt et. al., 2021). Besides, there are also other factor that contributes to student's satisfaction in ODL by other researchers such as learner's flexibility and technology expertise (Choudhury, 2020) which in line with internet and tools factor, teaching and learning approaches includes facilities provided by university (Kamil et. al, 2022 & Shom

et. al., 2021) and also the learner attitude (Ploj et. al., 2021) which is similar to the motivation for learning factors. In the end, all factors which lead to student's satisfaction towards ODL process will be based on current situation of student's itself. Each students have a different needs and it is the responsibility of the students itself to voice it out to their lecturer or university in order for ODL process to be effective.

Methodology

A convenience sample of 336 students from three faculties at UiTM Tapah participated in this study. A Google Form was created and utilized as a data collection instrument regarding Mathematical Learning Contentment with ODL (Azhar et. al., 2021). Due to COVID-19 pandemic restrictions, the Google Form link was shared via Whatsapp and Telegram applications. The dependent variable (DV) is ODL Satisfaction in Mathematics meanwhile the independent variables (IVs) in this study are Online Learning Readiness, Self-Directed Learning, Technologies, Internet and Tools, Skills and Acceptance, and Motivation for Learning. The DV is binary outcome divided into 1 assigned as Not Satisfy and 2 as Satisfy. Then, the IVs, are all interval scale of measurement with the level such 1 assigned as Strongly Agree, 2 as Agree, 3 as Neutral, 4 represents Disagree and 5 is Strongly Disagree The framework of variables is shown in Figure 1 below.

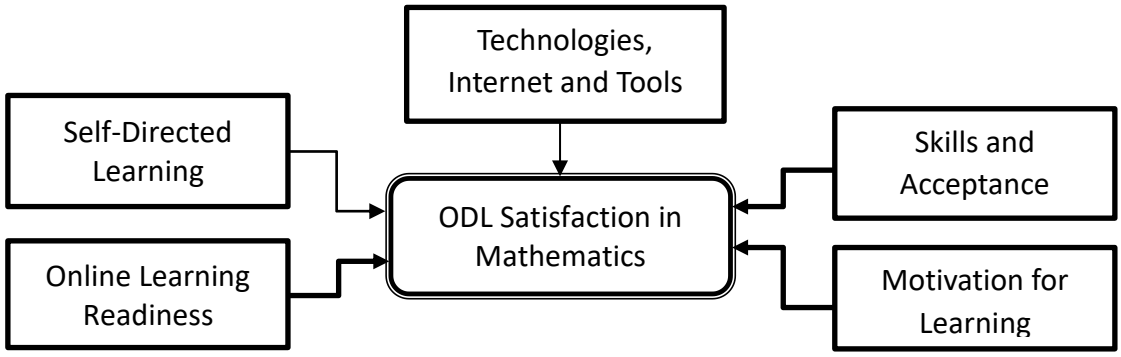

Figure 2. The framework of variables of study

The description of variables is in Table 1.

Table 1

Description of the variables in this study

Variable	Scale of Measurement	Level of variable
ODL Satisfaction in Mathematics	Nominal	1: Not Satisfy 2: Satisfy
Readiness	Interval	1: Strongly Agree 2: Agree 3: Neutral 4: Disagree 5: Strongly Disagree
Self-Directed Learning		
Technology, Internet and Tools		
Skills and Acceptance		
Motivation for Learning		

The data collected is then analyzed using a Logistic Regression analysis to achieve the objective of this study. The analysis procedures are as follow.

A) The Classification Table

It is concern to look at the proportion of cases that have been correctly classified. The classification table indicates how many cases where the observed values of the dependent variable were 1 or 0 were correctly predicted. In an ideal model, all cases will be on the diagonal, and the overall percent correct will be 100 percent (Hosmer and Lameshow, 2000). The overall percentage should be higher than 80 percent.

B) Model Chi-Square Test

The overall significance is tested using the Model Chi square, which is derived from the likelihood of observing the actual data under the assumption that the fitted model is accurate. The p-value is compared to a significance level, 0.05 to determine whether the overall model is statistically significant (Hosmer and Lameshow, 2000).

Result and Discussion

Classification Table

The results generated as all predictor variables are included as displayed in Table 1. It found that by adding all predictors, the model accuracy increased from 75.9 percent to 86.6 percent. It considered that the model is good as 99.8 percent of the questions were correctly classified. It means that 95.3 percent of students were correctly classified as Satisfy with ODL group, whilst 59.3 percent of students were correctly classified as Not Satisfy with ODL group.

Table 1

Classification Table

Observed (ODL Satisfaction)	Predicted (ODL Satisfaction)		Percentage Correct
	Not Satisfy	Satisfy	
Not Satisfy	48	33	59.3
Satisfy	12	243	95.3
Overall Percentage			86.6

Model Chi-Square

Based on Table 2, this study obtained that the Chi Square statistic was 32.818 with the degree of freedom (df) 8 and its p-value less than significance level 0.05 satisfied the model fitted requirement. It explained that the Online Learning factors have a significant influence on ODL Satisfaction in Mathematics. As a result, the logistic regression model in this study was significant and meaningful.

Table 3

Omnibus Tests of Model Coefficients of Logistic Regression.

Model	Statistic
Chi-square	32.818
Degree of freedom	8
p-value	0.000*

Note: *p-value<0.05

Likelihood Ratio

Based on Table 4, it found that there are no muticollinearity problems as the standard error obtained for each variable lies between -2 and +2. Suppose this study requires evaluating the extent to which the contributions of these five factors to ODL Satisfaction in Mathematics. The results found that Readiness, Self-Directed Learning, Skills and Acceptance, and Motivation had significance influence on ODL Satisfaction in Mathematics except Technology, Internet and Tools factor. This means that each additional increase of one level in Readiness is associated with an increasing the students' satisfaction level towards ODL in learning Mathematics by 7.052 more times Satisfy. In addition, each additional increase of one level in Self-Directed Learning, the students were 1.871 more times satisfied with ODL in learning Mathematics. Furthermore, when one level in Motivation for Learning is raised, it identified that the students were 1.617 more times satisfied with ODL.

This study discovered that the odd ratio of Technology, Internet and Tools and Skills and Acceptance were less than 1. This means that each additional increase of one level of Technology, Internet and Tools was associated with a 0.31 percent decrease in the odds of Satisfaction towards ODL. Meanwhile for Skills and Acceptance, each additional increase of one level was associated with a 0.33 percent decrease in the odds of Satisfaction towards ODL.

Table 4

Table of Logistic Regression Analysis on Factors ODL Satisfaction in Mathematics

Variable	Coefficient (β)	Standard Error	p-value	Exp (B)
Constant	-4.624	1.522	0.002*	0.010
Readiness	1.953	0.286	0.000*	7.052
Self-Directed Learning	0.626	0.230	0.006*	1.871
Technology, Internet and Tools	-0.364	0.227	0.109	0.695
Skills and Acceptance	-0.397	0.197	0.044*	0.672
Motivation for Learning	0.481	0.244	0.048*	1.617

Note: *p-value<0.05

Conclusion

As conclusion, this study disclosed that Readiness, Self-Directed Learning, Skills and Acceptance, and Motivation had significant influence on ODL Satisfaction in Mathematics except Technology, Internet and Tools factor. It revealed that Readiness, Self-Directed Learning, and Motivation for Learning were highly influence the ODL Satisfaction level in Mathematics. However, Technology, Internet and Tools and Skills and Acceptance had little reduction in ODL Satisfaction level in learning Mathematics. It is hoped that information obtained in this study will help educators to concern about factors that need to be improved in order to sustain the successful in ODL particularly in Mathematics.

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