Influence factors for proceeding with open and distance learning: UiTM Pahang sharing experience

Noor Izyan Mohamad Adnan¹, Suriyati Ujang², Sharifah Norhuda Syed Wahid¹, Nor Azizah Yacob¹, Azniza Ahmad Zaini² and Mohd Bakri Adam⁴

¹Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Pahang, Jengka Campus, Malaysia
²Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Pahang, Raub Campus, Malaysia
³Faculty of Business and Management, Universiti Teknologi MARA Pahang, Raub Campus, Malaysia
⁴Faculty of Science, Universiti Putra Malaysia, Malaysia
E-mail: noorizyan@uitm.edu.my

Abstract. COVID-19 pandemic has affected almost all sectors in the world, including education. As an effort to break the chain of virus spreading, schools and higher institutions in most countries have stopped all physical classes for a while. Ministry of Education has directed a virtual learning to be conducted in schools and higher education during Movement Control Order was implemented in Malaysia to proceed the teaching and learning process. The virtual learning included online and offline learning which is called as open distance learning. Hence, the main objective of this study is to identify the factors that influence the Universiti Teknologi MARA Pahang Branch students to continue practicing the open and distance learning. A set of questionnaires was disseminated to all 7,363 students of Universiti Teknologi MARA Pahang, where a number of 1,181 responses had been received from the survey conducted with a responding rate of 16%. The demographic aspects of the students were represented by a descriptive statistic and the identification of possible factors was used to build a new analysis model using logistic regression analysis. According to the results obtained, there are six factors that influenced the students to continue practicing ODL which are: 1) workstation, 2) internet access, 3) learning equipment 4) understanding learning video 5) frequency of device usage and 6) exchange of final examination to final assessment. Based on the overall model, 70.94% of the sample was correctly classified.

1. Introduction
Recently, the World Health Organization (WHO) declared that the spreading of COVID-19 has constituted a public health emergency of international concern, including Malaysia. Due to this pandemic, almost all sectors have been affected tremendously including the educational system whereby all schools, colleges and universities are immediately closed for temporary to ensure the safety of the students. Even though the COVID-19 cases are increasing rapidly, the importance of education for all students must not be abandoned by the government. Hence, it is the best decision for Malaysia’s educational system to overcome these challenges by introducing an online distance learning (ODL) mode. Previously, the ODL mode is only applicable for students who
are categorized as a part-time student at the higher education institutions. Nevertheless, the ODL mode has become an important tool nowadays, as it needs to be practiced by all the full-time students so that the teaching and learning processes can be proceeded as planned by the management. As an impact from the COVID-19 crisis, the online learning mode could be a great opportunity for the full-time students at the higher learning institution, as they are mostly young and energetic who capable to easily adapt the classes via online platform. Following that, the students may have to remain practicing the ODL regardless of their readiness and preparedness for the new learning platform. Therefore, the university authorities including lecturers should encourage and give supports to the students continuously by staying connected with them through online or any social media platform.

Commonly, a good online learning environment requires an adequate number of devices and a reliable internet connection at the first place. Study from [1] stated that the preferences of the students for applications that require low bandwidth and easily accessible during online learning were Google Classroom, Whatsapp, pre-recorded videos and lecture slides. In addition, the unstable internet connection and personal issues led to a feeling of discouragement of the students to actively participate in online classes. Although the students considered they had sufficient time and feedback for their tasks, they perceived ODL as difficult as their workload was higher than traditional face-to-face learning and they faced a lot of distractions at home which affected their understanding of the learning content. This issue is supported and clarified by [2], that the transition to online learning mode due to the pandemic crisis has raised load of questions regarding the abilities possessed by the educators and students to deal with the current advanced technology such as the computers and IT equipment. Besides, [1] also revealed that ODL requires the students to have high self-discipline and be resourceful for their self-learning.

Several studies mentioned that the contemporary education nowadays is more to self-paced or proactive learners [3, 4, 5]. The cases of reneging students will be due to stress or mentally affected, as there are cases of depression among students have been reported. In such state of mental health, the learning process will be no longer appropriate and suitable for the students to proceed. However, this can be avoided if the instructors are aware of the students’ behaviour and can identify the factors of the depression at an early stage of learning process. Another study by [4] stressed that learning environment matters greatly when the comparison was made between a traditional and online learning method, in line to the other study conducted by [6]. Furthermore, [4] stated that students’ preferences on the online learning can be predicted by gender, working status, their preparedness in term of technology, online course experiences, and their pace of learning. Meanwhile, [6] had identified whether the students will further the study via online platform were influenced by the background such as gender and family support. However, [6] emphasizes that the family and institution support throughout the process is crucial.

According to [7], the skills possessed by the students and instructors is one of the several factors influencing the students’ participation, as the skills can facilitate and enhance the students and instructors experience in practicing the online learning method. Moreover, [8] discussed that the factors influencing the students who persist or tend to drop out can be placed into a model of reciprocal causation that was proposed by [9, 10], whereby the students’ behaviour can be due to personal factors or environment. The personal factors refer to as self-efficacy, determination, autonomy, and time management. Meanwhile, the environmental factors refer to family support, organizational support, and also technical support. The course itself may attract the students to continue ODL if the instructor highlighted the relevance of the course and its importance.

As reported by [2] and [1], [11] also stressed that many students do not have the correct setup of online classes equipment such as books, computers, and high-speed internet connection which can interrupt the studies. This finding is in line with [12], where the study in Europe found that the selected respondents have no appropriate place or station to do homework, poor internet access, and limited access of the reference books. Due to this situation, universities do not have
enough infrastructure or resources to facilitate online teaching with immediate effect [13].

Online classes are not limited to equipment needed only, but also much related to the assessment procedure. As stated by [14], that the transition from face-to-face teaching to online delivery has a serious impact on assessments and evaluation. Several universities have already suspended the semester-end final examinations, while a continuous assessment will be implemented throughout the online classes. Therefore, a clear direction regarding the procedures of administrating all the assessments should be provided to the students [15], as well as the change of the assessment types should be done in order to ensure the students are willing to continue with ODL [16]. Besides, the university authorities should frame a flexible assessment guideline to keep in mind that students are not at a disadvantage [11]. Some courses that cannot be delivered online such as art and laboratory practical, the faculty can simply give evaluation to students based on the work that the student have done or suspend the classes until the condition is back to normal.

Since the pandemic crisis impacted directly the educational system in Malaysia, this study aims to determine the factors that influence the students of higher learning institutions to remain practicing the open and distance learning (ODL) mode including the individual background, equipment for online classes, materials provided and the assessment procedure. There are 16 factors were tested for the logistic model, which are (1) gender, (2) age, (3) number of current semester, (4) faculty, (5) parents' occupation, (6) family income, (7) has chronic disease, (8) types of house, (9) number of family members, (10) workstation for ODL during MCO, (11) internet access, (12) learning equipment, (13) learning equipment, (14) frequentness of device usage, (15) understanding learning video and (16) exchange of final examination to final assessment. These 16 factors are selected based on the result of related literature reviews reported and the ODL policy made by UiTM Pahang such as the exchange of final examination to final assessment.

2. Methodology
This is a cross-sectional study that analyzed data from a subset of representative or sample at a specific time point. The population of this study involved all 7,363 students of Universiti Teknologi MARA Cawangan Pahang. A set of questionnaires was disseminated to all students of Universiti Teknologi MARA Pahang, where a number of 1,181 responses had been received from the survey conducted with a responding rate of 16%. A descriptive statistics and logistic regression analysis were used in analyzing the data, as it will provide the best output to achieve the objectives. A comprehensive literature review on the related study was done at the first stage. Following that, a thorough set of survey questions consists of demographic characteristics, the challenges factors during ODL, and the influencing factors of Universiti Teknologi MARA students at Pahang branch to remain practicing the ODL was done at the second stage. The demographic section consists of 10 categorical variables which are gender, age, education level, number of semesters, faculty, parents' occupation, family income, have a chronic disease, house type and number of family member. Next, the second section consists of 6-point likert-scale questions (from 1: being very problematic to 6: being no problematic), measuring the challenge factors during ODL. There are five questions in this section, which are accessing the learning materials, preparing assignments, submission of assignments, recording the attendance, and attending the online classes. Moreover, the next section consists of 11 categorical variables that measures the influencing factors of Universiti Teknologi MARA students at Pahang branch to proceed with the ODL. The 11 questions include the workstation, adequate monthly income, accessible of internet, adequate internet data, internet access region, complete equipment, number of devices, adequate devices, frequentness of device usage, understanding of the learning video, and the changes of final examination to final assessment. Besides, the data collection was done as soon as the survey questions were distributed.

All the data collected then was recorded and analyzed using an open-source software R version
4.0.2. The raw data was screened, explored, and cleaned. The distributions and frequencies were examined, before it was analyzed by performing the descriptive statistics and logistic regression analysis. Then, the data exploration was done including the descriptive statistics and graphs for each variable to describe the demographic characteristics of the students’ location based on their decision level whether to continue practicing the ODL or not. The frequencies and percentage were obtained for the categorical variables. Moreover, the logistic regression analysis was used to identify the influencing factors that were significantly associated with the practicing the ODL. The response variable of interest only has two possible qualitative outcomes, whether the students are ready for ODL or not. This can be represented by a binary indicator variable taking on values 0 (no) and 1 (yes) for each subject is “success” or “failure”. The \( \pi(x) \) denotes the “success” probability at value \( x \), thus the logistic regression model has linear form for the logit of this probability,

\[
\text{logit}[\pi(x)] = \log \left( \frac{\hat{\pi}(x)}{1 - \hat{\pi}(x)} \right) = \alpha + \beta x.
\] (1)

Furthermore, an automatic stepwise selection method which involved both forward and backward stepwise was used in the variable selection. At this stage, a preliminary final model was obtained. A further analysis was conducted to ensure the accuracy and predictive validity of the logistic regression model. The dependent variables are listed as follows:

- \( x_1 \): Gender
- \( x_2 \): Age
- \( x_3 \): Educational Level
- \( x_4 \): Number of Semester
- \( x_5 \): Faculty
- \( x_6 \): Father’s Occupation
- \( x_7 \): Mother’s Occupation
- \( x_8 \): Family Income
- \( x_9 \): Have a Chronic Disease
- \( x_{10} \): House Type
- \( x_{11} \): Number of family Member
- \( x_{12} \): Adequate Monthly Income
- \( x_{13} \): Workstation
- \( x_{14} \): Adequate Devices
- \( x_{15} \): Internet Access
- \( x_{16} \): Adequate Internet Data
- \( x_{17} \): Internet Access Region
- \( x_{18} \): Complete Equipment
- \( x_{19} \): Number of Devices
- \( x_{20} \): Frequentness of Device Usage
- \( x_{21} \): Understanding Learning Video
- \( x_{22} \): Exchange of Final Examination to Final Assessment

3. Results and Discussion
The result section consists of two parts, which are exploration of data and logistic regression model. In the exploration of data section, the numerical data will be summarised in detail, while the categorical data of demographic characteristics will be presented in the bar plot based on the student’s preference level whether to continue practicing the ODL or not. While in the logistic regression model section, a logistic model with the associated factors that influence the students to proceed with ODL as well as the model accuracy value for the data will be presented.
3.1. Exploration of Data
This section will describe all the variables included in this study by using descriptive statistics. Table 1 summarises the numerical data. There are seven values to be considered, ranging from minimum, first quartile, median, mean, third quartile, maximum and standard deviation value. It shows that there is a disperse variation in the family income, starting from RM200 up to RM120,000 with an average of RM4,088. For the age of the students, the minimum, maximum, and average age are 18, 23 and 20 years old respectively, where it shows the smallest data variation compared to family income with a standard deviation of 1.29 and 6313.27, respectively.

Table 1. Summary statistics of Minimum, Maximum, Quartiles, Mean and Standard Deviation for Age and Family Income.

| Summary Statistics | \( x_2 \) (Age) | \( x_8 \) (Family Income) |
|--------------------|-----------------|--------------------------|
| Minimum            | 18              | 200                      |
| 1st Quartile       | 19              | 1500                     |
| Median             | 20              | 3000                     |
| Mean               | 19.87           | 4088                     |
| 3rd Quartile       | 20              | 5000                     |
| Maximum            | 23              | 120000                   |
| Standard Deviation | 1.29            | 6313.27                  |

The descriptive statistics were performed by using bar plot for gender, faculty, family income and possess chronic disease based on the students’ preference level whether to continue practicing the ODL or not. There are 184 male students and 997 female students involved in this study. The result in Figure 1 shows that majority of male and female students decided to proceed with ODL with a number of 99 (53.8%) and 588 (59.21%) students respectively. Both science technology and social science students agreed to continue the ODL, which involved 487 (58.75%) and 200 (57.47%) students, respectively. The students were divided into three groups of household income which are B40 (household income less than RM4,849), M40 (household income between RM4850 to RM10,959) and T20 (household income greater than RM10,960). Figure 2 depicts that most students from all different level of family income chose to remain practicing ODL with 56.25%, 61.54% and 62.50%, respectively. Meanwhile, 62.5% of the students with no chronic diseases decided to proceed with ODL compared to those who have chronic diseases.

The students were asked for the comfort levels throughout the three ODL phases. The six comfort levels among the students throughout the three ODL phases in Figure 3 proven that majority of the students are in difficulties at the beginning of the ODL phase which is represented by the “problematic” (green bar), followed by the equal number of students who are at “very problematic”, “less problem” and “no problem” level. In the middle phase ODL, most students face less problem, which is shown by “less problem” (orange bar), followed by students who are at “problematic” and “no problem” level. Last but not least, the current phase depicts that most of the students are at their comfort level which are “no problem” (red bar) and “less problem” (orange bar) level. Most students who faced difficulties in the early phase of ODL are those from household income of group B40 and M40 with a total of 3 to 13 family members per house.
Figure 1. Gender and faculty characteristics based on the preference level to continue ODL.

Figure 2. Family income and chronic disease characteristics based on the preference level to continue ODL.

Figure 3. The comfort level of the students throughout the ODL.
Moreover, Figure 4 illustrates the result of the six ODL's challenge factors among the students that need to be considered. The factors include accessing learning materials, preparing assignments, submitting assignments, recording the attendance, and attending the online classes. As these five factors were referred to the teaching and learning process via ODL mode, the result proved that most of the students have not been burdened much during the ODL session. This can be seen by a huge difference obtained for each factor between “no problem” and “problematic” scale.

![The challenges factors among students during ODL](image)

**Figure 4.** Challenge factors among the students during ODL.

Furthermore, the element needs to be considered is the facilities owned by the students during ODL. The result in Table 2 shows that most of them own the facilities to participate in ODL session, which are workstation (67.7%), enough devices (86%) and enough internet data (63.6%). However, the result also tells that majority of the students have difficulties for internet access (72%).

| Variables                  | Yes   | No    |
|----------------------------|-------|-------|
| Workstation at home        | 67.7% | 32.3% |
| Good internet access       | 28%   | 72%   |
| Enough number of devices   | 86%   | 14%   |
| Enough internet data       | 63.6% | 36.4% |

**Table 2.** Facilities owned by students throughout the ODL.

3.2. Logistic Regression Analysis

This section emphasizes on the students’ preparedness model and the factors that influence the students to proceed with ODL. Out of 22 variables, only eight variables were selected to be considered in the model. The students’ preparedness model was selected by performing the stepwise method from the lowest value of AIC with the estimated logistic model, which is written as
\[
\ln \left( \frac{\hat{\pi}}{1 - \hat{\pi}} \right) = -3.239 + 3.045 \times 10^{-5} x_8 + 0.512 x_{13} + 0.708 x_{15} + 0.586 x_{18} \\
+ 0.246 x_{19} - 0.032 x_{20} + 1.225 x_{21} + 1.255 x_{22}.
\] (2)

Table 3 shows the value for the coefficient of all eight predictor variables with the p-value. There are five predictor variables associated with the factors that influence the students to decide whether to proceed with ODL or not, including the workstation, internet access, learning equipment, frequentness of device usage and changes of final examination to final assessment. All the five variables show the p-values are less than 0.05. By referring to the exp(B) value, the result can be concluded that the students’ probability of not choosing to remain with ODL in future would be likely increasing by 3% as the scale for each unit increases in the frequentness of device usage. On the other hand, the students’ probability of choosing to proceed with ODL in the future would be likely increasing by 67% and 80% if they have a proper workstation and full of equipment. Besides, the results also show that the probability of the students to continue the ODL in the future is 2 times higher if they have a good internet access and 3 times higher if they understand the learning video provided by their lecturers, and if the final examination is replaced by final assessment.

| Variables                                | B\(^a\) | Exp(B)\(^b\) | p-value   |
|------------------------------------------|---------|--------------|-----------|
| \(x_8\) (Family income)                 | 0.00    | 1.00         | 0.1221    |
| \(x_{13}\) (Workstation)               | 0.51    | 1.67         | 0.0005*   |
| \(x_{15}\) (Internet access)           | 0.71    | 2.03         | 0.0001*   |
| \(x_{18}\) (Complete equipment)        | 0.59    | 1.80         | 0.0000*   |
| \(x_{19}\) (Number of devices)         | 0.25    | 1.28         | 0.0849    |
| \(x_{20}\) (Frequentness of device usage) | -0.03  | 0.97         | 0.0272*   |
| \(x_{21}\) (Understanding learning video) | 1.22   | 3.40         | 0.0000*   |
| \(x_{22}\) (Exchange of final examination to final assessment) | 1.26   | 3.51         | 0.0000*   |

\(^a\) Value of coefficient  
\(^b\) Exponential value of coefficient

Likelihood is the probability of observed results given the parameter estimates and -2 times the log likelihood (-2LL) is a measure of how well the estimated model fits the categorical data. In order to test the overall model, a likelihood ratio test was performed for the model with significant independent variables. The p-value obtained from this is \(2.2 \times 10^{-16}\) less than 0.05 which means that the model is fit. The \(R^2_{\text{Nagelkerke}} = 0.6101\) indicates that 61.01% of total variation in students’ decision to proceed with ODL can be explained by set of all eight predictor variables.

The model accuracy was measured as the proportion of observations was classified correctly. Confusion Matrix is one of the accuracy testing techniques which is often used to describe the performance of a classification model on a set of test data for which the true values are known. Table 4 shows the classification table with all predictor variables. Based on the model, 82.10% of the students are correctly classified as to proceed with ODL, while 55.31% of the students are correctly classified as not to proceed with ODL. On the other hand, 17.9% of the students who are predicted to disagree with the continuous of ODL actually decided to proceed with
Table 4. Classification table with all predictor variables.

|                | Predicted Not Proceed | Predicted Proceed | Percentage Correct |
|----------------|-----------------------|-------------------|--------------------|
| Not Proceed    | 271                   | 219               | 55.31%             |
| Proceed        | 123                   | 564               | 82.10%             |
| Overall Percentage |                  |                   | 70.94%             |

Moreover, 44.69% of the students who are predicted to agree with the continuous of ODL actually decided not to proceed with ODL. As a result in the overall model, 70.94% of the sample is correctly classified.

Absolutely, the preference for ODL mode is much related to the internet access, proper workstation, and enough learning equipment as all these matters are in line with the previous studies conducted by [12, 11]. Besides, the online classes will be classified as successful if these factors are considered seriously to ensure that the students are well prepared and ready to proceed with ODL mode. In addition, the students’ readiness is also much related to the ability to understand the learning materials provided by their lecturers, especially the videos content as supported by the studies done by [13] and [4].

Furthermore, this study revealed that students’ readiness to proceed ODL mode is significantly due to the format changes made, which is from the final examination to final assessment as in line with the previous studies [16, 15, 14]. As mentioned earlier, [16, 15, 14] found that several universities have already suspended the final examinations and implemented a continuous assessment along with the online classes. Therefore, it is clearly proved that the assessment procedure contributes as a significant factor in influencing students to proceed with the ODL mode.

4. Conclusion and Recommendation
The main objectives of this study are to examine the factors that influenced students to continue the learning process with the open distance learning method and hence, develop a new analysis model using logistic regression analysis. Based on the findings, the students agreed to pursue ODL since they have a workstation at home, enough devices, and enough internet data. However, many students have problem with an internet connection which cause the students are unable to follow ODL appropriately. The students also choose to continue with ODL if the explanation in learning videos given by the lecturers are understandable and the format of final examination is substituted with a final assessment. The findings also illustrated that most male and female students from both science technology, and social sciences disciplines agreed to proceed with ODL for the study. Meanwhile, the healthy students have no problems in ODL compared to the students with chronic diseases. Many of the students from B40 agreed to pursue ODL; however, most of the students also chose not to continue ODL compared to M40 and T20. In the first phase, many students had difficulties during the ODL session, but can managed to adapt the situation and did well in the studies as time passes. Moreover, most of the students have not been burdened to access learning materials, prepare assignment, submit assignments, record attendance, and join online classes during ODL session. However, this situation does not represent an overall response from UiTM students since only 27.65% of the students are participated in this survey. Further, a new analysis model was developed to calculate whether the students have chosen ODL or not by considering eight predictor variables which are family income, workstation, internet access, full equipment, number of devices, frequentness of device usage, understanding learning
video and the change of final examination to final assessment. Based on the model, 82.10% students are correctly classified as a agreed to proceed ODL, while 55.31% did not agree. If the government or student’s family can provide a good internet connection, enough devices, and good surroundings, ODL can be implemented successfully. This study can be used as a reference by other researchers and management team especially student affairs department to help students and to improve existing procedure in implementing ODL. In the future, the researcher can extend this study by investigating the current situation faced by the students after a year and during MCO 2.0.

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