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The Impact of Student-Content, Student-Student and Student-Instructor Interactions on Students Satisfaction with Online Distance Learning: A Multiple Linear Regression

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Abstract: The present study aims to determine the significant factors (student-student interaction, student-content interaction, and student-instructor interaction) contributing to the students' satisfaction with online distance learning. An online survey was conducted among 351 students of Universiti Teknologi MARA (UiTM) Cawangan Kelantan, Kampus Kota Bharu from semester 3 to semester 7 (March 2023 - July 2023). The data collected was analyzed using a multiple linear regression analysis. The findings reveal that student-student interaction, student-content interaction, and student-instructor interaction are the significant factors that contributed to students' satisfaction with online distance learning. In addition, student-instructor was also found to be the most influential factor that affects students' satisfaction with online distance learning. The insights gained from this research can guide educators and higher learning institutions in enhancing their teaching strategies and course designs, ultimately leading to more engaging and effective learning experiences for students in their learning environments.

Keywords: Online distance learning, Student-Content interaction, Student-Instructor interaction, Student-Student interaction, Students satisfaction

1 Introduction

The COVID-19 pandemic has significantly altered the landscape of teaching and learning within higher education institutions. This transformation has shifted traditional learning environments towards online modes, necessitating educators and students to develop digital skills and competencies. This shift implies an ongoing implementation of educational innovations to meet the evolving demands of the education sector. The sudden shift in how education is delivered has affected the normal functioning of all academic institutions globally. The transition from face-to-face teaching and learning to an online base has significantly influenced students' satisfaction with the teaching and learning process. Numerous studies have been carried out on the determinants of students' satisfaction with online distance learning. The level of satisfaction has been found to be one of the most significant considerations influencing the continuity of online learning [1]-[2].

Therefore, it is crucial to evaluate factors that contribute to students' satisfaction levels to enhance the quality and effectiveness of online education. The dynamics of interaction in online classes are a subject of debate, given that electronic communication may not be as effective as traditional forms of communication. The absence of emotions, body language, and facial expressions is significant in class because they cannot be displayed in an online class and give satisfaction to the students [3]. Student satisfaction with online teaching is primarily attributed to the acceptance of online learning and

the quality of course content. Creating an educational environment that fosters student engagement, selecting appropriate course content, and enhancing online interactions are essential factors that contribute to students' academic efficacy [4], which in turn affect their level of satisfaction in the teaching and learning process.

Students' satisfaction with online classes refers to students' contentment with the interactions of student-student, student-teacher, and student-content, or learning experiences in a virtual class [5]. According to previous studies, some of the key determinants of student satisfaction with online learning, including student's engagement [6], [7], [8], [9], learner-learner interaction [10]-[11], learner-instructor interaction, and learners' interaction with the contents [12]-[13]. Student-content interaction is about how students engage with their textbooks, tutorial videos, and other course materials. It involves the use of software applications such as PowerPoint presentations, audio-visual presentations, group tasks, individual assignments, and integrated course resources. A previous study has shown that there is link between student-content interaction and student satisfaction [14].

Student-content interaction results in a positive and motivational outcome, deep understanding, and knowledge sharing [3], [15]. The design of the content is critical to knowledge sharing between the teachers and students and among the students themselves [15]. In virtual learning environments, students are typically self-motivated to engage in content-oriented interaction [16]. A previous study has successfully shown that, student-content interaction has a positive impact on students' satisfaction [15]. Besides that, as compared to student-teacher and student-student interactions, student-content interaction has been observed to exert approximately twofold greater influence on learning outcomes [17]. Interaction with the content has been identified to be closely related to the course content quality, which in turn affects student satisfaction [13]. The better the content quality is, the more motivated and satisfied the learners are [18].

Student-student interaction exists when two or more people or groups of students come together during class discussions, assignments, or projects to work together as a team to achieve a given task [19]. It is often considered as an indicator of student satisfaction in online courses [20]. Student-student interaction had been proven to have a positive effect on students' satisfaction [15]. In addition, the interaction between learner and learner is important for both student satisfaction and students' academic achievement in online learning, as it allows students to socialise, exchange, and discuss ideas and participate in group activities [11].

The previous study supported that student-teacher interaction is the most influential factor and has a higher impact on student satisfaction [21]. In online learning, learner-instructor interaction is a major determinant of student satisfaction [22]. Instructor-student interaction not only affects students' engagement in the online class but also has a significant effect on students' satisfaction [23]. Therefore, this study aimed to identify the determinants of students' satisfaction with online distance learning. To assess students' satisfaction levels, it is essential to analyse specific factors using the model proposed by Moore and Kearsley [24]. This model primarily considers learner-content, learner-instructor, and learner-learner interactions as key factors influencing respondents' satisfaction. By understanding these factors can contribute to the enhancement of educational practices, helping to optimize online teaching strategies and enhance the overall educational experience.

2 Methodology

This section describes the conceptual model, target population, study design, sampling design including sample size determination and the selection of the sampling technique, research instrument, data collection method, and method of data analysis employed for this research.

A Conceptual Model

The main goal of this research is to examine the impact of independent variables (student-content interaction, student-student interaction, and student-instructor interaction) on dependent variable (students' satisfaction with the online distance learning). The conceptual model which portrays the interconnection between the independent variables and dependent variable is shown in Figure 1.

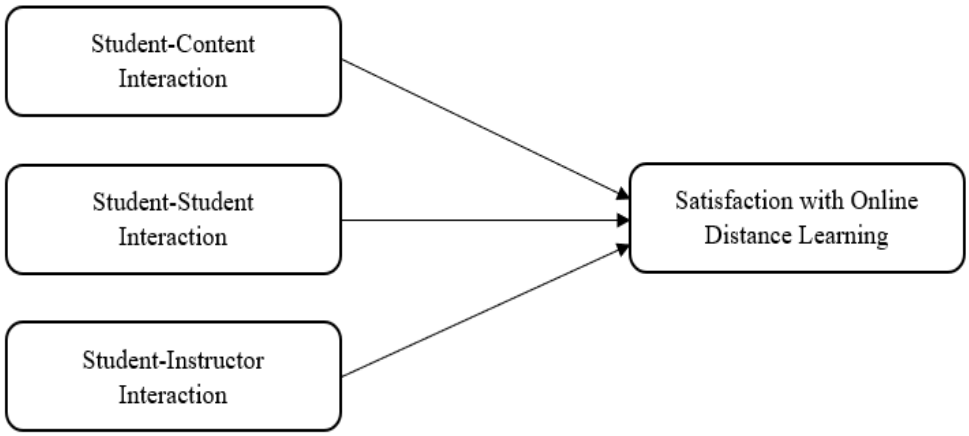


Figure 1: Conceptual Model

Based on the conceptual model, there are three research hypotheses need to be tested. The required research hypotheses are listed as follows:

H_{11}: Student-content interaction significantly affects students' satisfaction with the online distance learning.

H_{12}: Student-student interaction significantly affects students' satisfaction with the online distance learning.

H_{13}: Student-instructor interaction significantly affects students' satisfaction with the online distance learning.

B Target Population

The target population for this study was 1117 students from Universiti Teknologi MARA (UiTM) Cawangan Kelantan, Kampus Kota Bharu, covering six different courses which were Bachelor of Business Administration (Hons.) Finance (BA242), Bachelor of Business Administration (Hons.) Islamic Banking (BA249), Bachelor of Business Administration (Hons.) Economy (BA250), Bachelor of Business Administration (Hons.) Marketing (BA240), Bachelor of Science (Hons.) Statistics (CS241) and Bachelor of Science (Hons.) Statistics and Bachelor of Entrepreneurship (Logistics and Distributive Trade) with Honours (CS291). Only students from semester 3 to semester 7 were eligible to participate in this study, as students from semester 1 to semester 2 were in Machang campus. The sampling frame for this study was obtained from the Academic Affairs Office of UiTM Cawangan Kelantan, Kampus Kota Bharu.

C Study Design

A cross-sectional study was employed in this study as the data was collected at a single point in time, which is from March 2023 until July 2023.

D Sampling Design

i. Sample Size Determination

From a total of 1117 students, a recommended sample size by the Raosoft software with 5% margin of error and 95% confidence level is 287. By considering a dropouts or sampling errors, a 10% increase of this sample size had been decided. Thus, the total sample size for this study were 316 students.

ii. Sampling Technique

The participants of this study were recruited using proportionate stratified random sampling technique, with a sample size of n=316. In this study, the students were stratified according to their course enrollment (i.e., BA240, BA242, BA249, BA250, CS241, and CS291). As this study adopted proportionate stratified random sampling. Hence, the number of samples for each course pursued needed to be calculated (sample size of the strata = size of entire sample / population size * layer size). The required sample sizes for each course are summarized in Table 1.

Table 1: Sample Size for each Course

Course	Number of People in Strata	Number of People in Sample
BA240	195	316/1117*195 = 55.16 ≈ 55
BA242	344	316/1117*344 = 97.31 ≈ 97
BA249	198	316/1117*198 = 56.01 ≈ 56
BA250	170	316/1117*170 = 48.09 ≈ 48
CS241	201	316/1117*201 = 56.86 ≈ 57
CS291	9	316/1117*9 = 2.55 ≈ 3

E Research Instrument

This study used a semi-structured questionnaire as a research instrument which consisted of five sections (Section A: Demographic Profile, Section B: Student-Content Interaction, Section C: Student-Student Interaction, Section D: Student-Instructor Interaction). A summary of the number of items for each section is provided in Table 2.

Table 2: Summary of the Number of Items for each Section

Section	Number of Items	Scale
A: Demographic	4	Not Applicable
B: Student-Content Interaction	8	A 10-point Likert response range from strongly disagree to strongly agree
C: Student-Student Interaction	8	
D: Student-Instructor Interaction	9	
E: Satisfaction with Online Distance Learning	8	

F Ethical Approval

Ethical approval was obtained from the Research Ethics Committee, Universiti Teknologi MARA dated 15th March 2023.

G Data Collection Method

The self-administered questionnaire was used to collect the data for this study. The questionnaire of this study was constructed using the Google Form platform. The generated link of this questionniare was shared with the selected participants through WhatsApp. The participants were asked to complete the questionnaire in 15-20 minutes, where their participation in this study was fully voluntary.

H Method of Data Analysis

i. Descriptive Analysis

The descriptive statistics was used to present quantitative descriptions of the demographic profile of respondents of this study including gender, age, semester, and course of enrolment.

ii. Reliability Analysis

The reliability analysis was used to measure internal consistency of scale of the questionnaire of this study. The most popular reliability statistics used today is the Cronbach's alpha, where it is to indicate whether the questionnaire is reliable or not. If the value of Cronbach's alpha is less than 0.6, it implies poor internal consistency, those in the 0.7 range are acceptable and those over 0.8 are good.

iii. Multiple Linear Regression Analysis

The multiple linear regression analysis was used to determine which determinants (student-content interaction, student-student interaction, and student-instructor interaction) significantly influence students' satisfaction with online distance learning. The model involved in this study is written as in equation 1.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (1)$$

Where

Y: Students' Satisfaction with Online Distance Learning
X_1: Student-Content Interaction
X_2: Student-Student Interaction
X_3: Student-Instructor Interaction

The goodness of fit of the regression model was assessed through the value of R-square, which were also known as coefficients of determination. It is used to know how well the model could be used to predict future outcomes. It examines the fitted regression line to the data, and how well this line represents or fits the data. The value of R-square lies between 0 and 1 inclusive. Values of R square that are close to 1 imply a better estimation of the regression line that fits the points. In general, the higher the R square, the better the model fits the data.

The next analysis after conducting checking on fitness on the model, was to check for model adequacy. All these assumptions which were normality assumption, homoscedasticity assumption and multicollinearity must be satisfied to use the model to predict dependent variables precisely. Normal probability plot and histogram plot can be used to check whether normality assumption was violated or not. Meanwhile, the homoscedasticity was evaluated using a scatterplot of residual versus predicted. If the points on the scatterplot do not show any pattern, it can be concluded that the homoscedasticity assumption is met, and the error variance was constant.

When more than one independent variable appeared in a regression model, it was possible that these variables were related to each other. If the dependent variables were related to each other, multicollinearity among the variables was said to be existed. The existence of multicollinearity problems could be accessed from the coefficients known as variance inflation factor (VIF). The multicollinearity problem exists when the VIF is greater than 10.

The overall F-test was used to check on the significance of the model by observing the p-value provided in the ANOVA. The model was significant when the p-value was less than 0.05. Individual t-test was a statistical test used to determine whether the predictor variables (student-content interaction, student-student interaction, student-instructor interaction), if any, were significantly influencing the

response variable (students' satisfaction with online distance learning). The predictor variable was said to significantly influence the response variable if the p-value was less than 0.05.

3 Findings

A Descriptive Analysis

Figure 2 describes distribution of respondents according to gender, age group, semester, and course of enrolment.

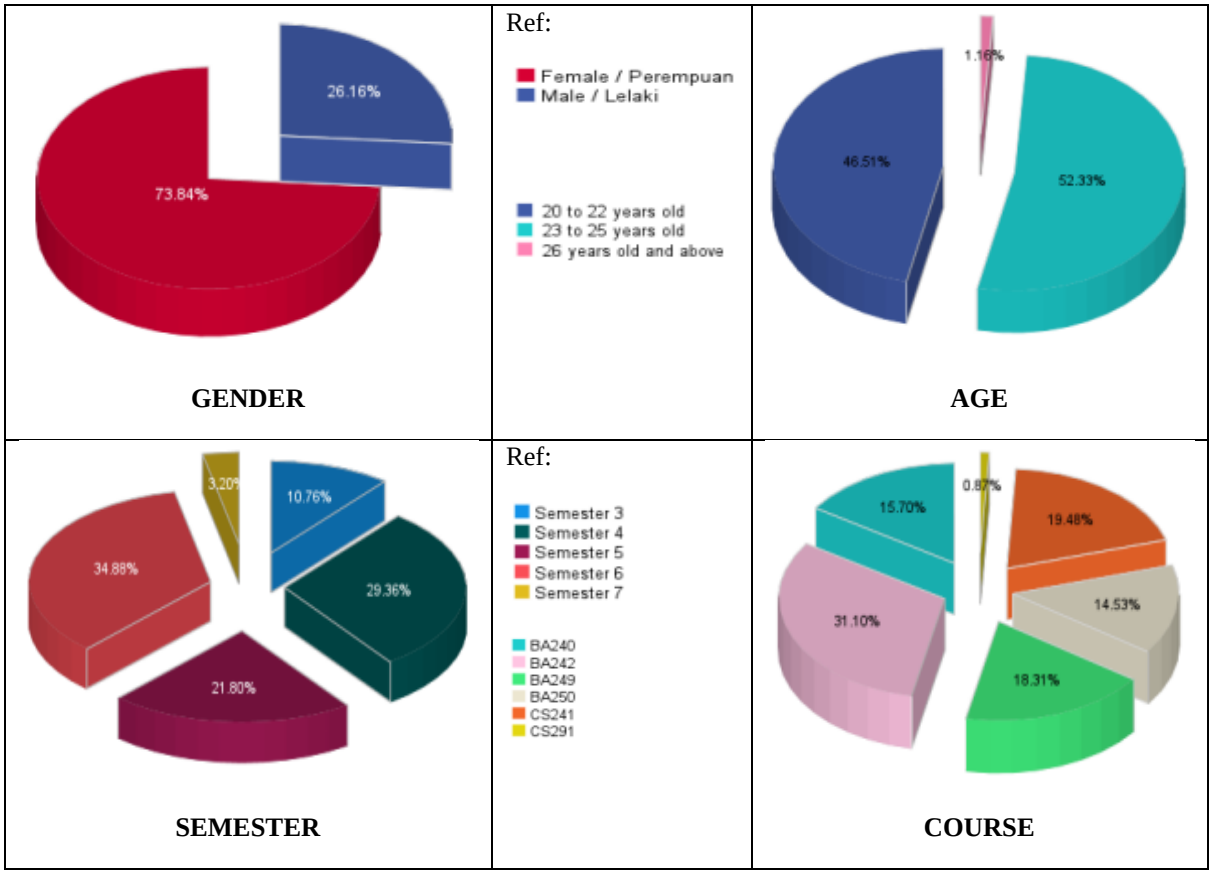


Figure 2: Distribution of Respondents

Based on the pie chart displayed in Figure 2, majority of respondents participated in this study were female (73.84%), aged between 23 to 25 years old (52.33%), came from semester 6 which is 34.88%, out of 316 respondents and enrolled in course BA242 (31.1%).

B Reliability Analysis

Table 3 shows all the Cronbach's alpha values for each construct involved in this study. Since the Cronbach's Alpha Coefficient exceeded the minimum value of 0.6, it can be said that all the items in each construct are deemed to have adequate reliability.

Table 3: Summary of Reliability Analysis for each Construct

Construct	Number of Items	Cronbach's Alpha Coefficient
Student-Content Interaction	8	0.949
Student-Student Interaction	8	0.928
Student-Instructor Interaction	9	0.938
Satisfaction with Online Distance Learning	8	0.963

C Multiple Linear Regression Analysis

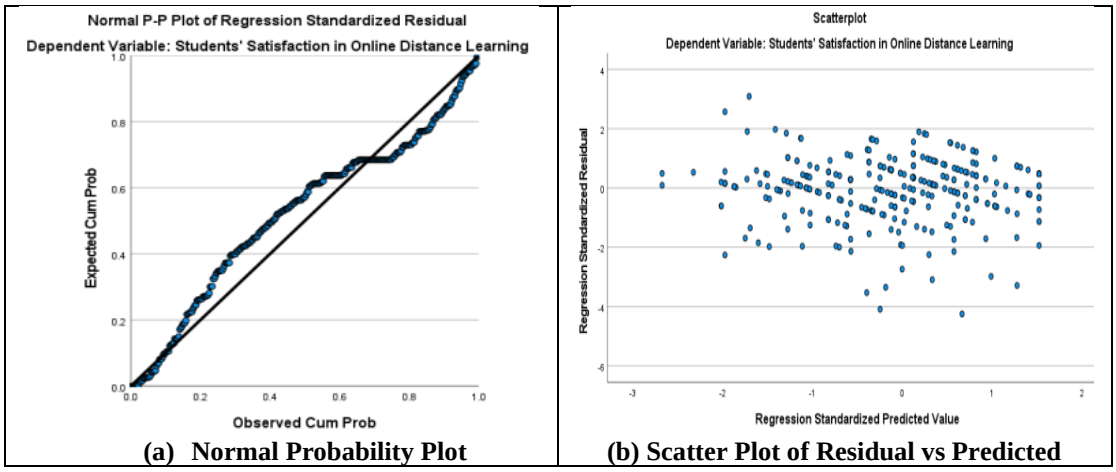
The value for R-square is 0.631, denoting that 63.1% of the total variation in students' satisfaction in online distance learning is explained by student-content interaction, student-student interaction, and student-instructor interaction. Meanwhile, the remaining 36.9% of total variation is explained by other factors.

Table 4: Goodness of Fit

R-Square
0.631

Based on Figure 3(a), which represents the normal probability plot of regression standardized residuals, it becomes apparent that the data points were aligned closely with the fitted line. Therefore, it can be concluded that the regression function is linear, and the error term were normally distributed. Hence, it is reasonable to infer that the assumption of normality was met.

Figure 3(b) illustrates a scatterplot of residual versus predicted of the model. It shows that the plot is randomly scattered and does not show any obvious pattern. This pattern of less distribution indicates that the regression function was linear, and the error terms have constant variance.



(a) Normal Probability Plot **(b) Scatter Plot of Residual vs Predicted**

Figure 3: Normality and Homocedasticity Assumptions

Table 5 shows that all independent variables were uncorrelated among themselves. This observation is drawn from the fact that the value of variance inflation factor (VIF) was below 10. Thus, the multicollinearity among student-content interaction, student-student interaction and student-instructor interaction is said to be not existed.

Table 5: Multicollinearity Assumption

Construct	VIF
Student-Content Interaction	2.426
Student-Student Interaction	2.929
Student-Instructor Interaction	2.917

Table 6 shows that the calculated p-value was <.000 which is less than significance level, 0.05. Therefore, it can be concluded that the multiple linear regression model is statistically significant, implying that at least one of the predictor variables (student-content interaction, student-student interaction, student-instructor interaction), if any, is significantly affecting the response variable (students' satisfaction with online distance learning).

Table 6: Test for Significance of Regression Model

Model	Sum of Square	DF	Mean Square	F Statistics	Sig.
Regression	593.517	3	197.839	128.352	<.000
Residual	524.070	340	1.541		
Total	1117.586	343			

Table 7 highlights the estimated regression function with significant value of individual predictor variables. Since the whole p-value falling below 0.05, thus it means that student-content interaction, student-student interaction, and student-instructor interaction significantly influence students' satisfaction with online distance learning.

The most influential contributor to students' satisfaction with online distance learning is indicated by coefficient values. In this case, among the examined factors, the factor with the highest coefficient is student-instructor interaction, denoted as β_3 with a value of 0.327. This coefficient signifies that for every one-unit increase in student-instructor interaction, there is an associated increase of 0.327 in students' satisfaction.

Table 7: Test for Significance of Individual Predictor Variable

Variable	Coefficient Value	Standard Error	T Statistics	Sig.
Constant	0.205	0.373	0.550	0.583
Student-Content Interaction	0.322	0.067	4.787	<.000
Student-Student Interaction	0.271	0.072	3.772	<.000
Student-Instructor Interaction	0.327	0.073	4.489	<.000

The fitted regression model is as follows:

$$Y = 0.205 + 0.322X_1 + 0.271X_2 + 0.327X_3 + \varepsilon$$

4 Conclusion

The study aims to identify the significant factors (student-content interaction, student-student interaction, student-instructor interaction) that contributed to students' satisfaction in online distance learning. Since all the p-value is less than the level of significance 0.05, this indicates that these three factors significantly influence student's satisfaction in online distance learning. This study also found that the most influential factor for online distance learning is student-instructor interaction since it has the highest value of beta coefficient. However, the findings of this study is only limited to UiTM Cawangan Kelantan Kampus Kota Bharu.

To instil the core values that lead to a better understanding about student satisfaction, the scope should be extended to all students from universities in Malaysia due to differences in environment and programs offered in the higher learning institutions. Expanding the scope of the study to include students from diverse program enrolments and universities in Malaysia will provide a more representative sample, allowing researchers to capture a wider range of perspectives and experiences. Moreover, future studies can consider other factors which may have significant impacts on student's satisfaction with online distance learning. This will provide a better understanding of important factors contributing to the student's satisfaction with online distance learning, ultimately leading to better strategic planning in providing a more conducive online learning environment to the students and instructors.

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