On Regression Modeling for Students' Attitude towards Statistics Online Learning in Higher Education

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Abstract
        Students during the distance education were experiencing solitude and depression in their studies due to no social interaction which led to psychological suffering. In this article, college students' attitudes toward statistics learning were investigated, and its predictors by statistical modeling. This study used a complex-correlational research design and primary data were utilized and gathered through complete enumeration. The data were summarized using descriptive statistics, and presented in tabular form. As for modeling the predictors of students' attitudes in learning statistics, it was done through multiple linear regression via the Ordinary Least Square Approach. The finding of statistical calculations revealed that, on average, students possess a "neutral attitude" towards learning statistics online. This suggests that students do not show active involvement and positive engagement in the classroom environment due to some challenges they have encountered during online learning. The regression model I revealed that students who are using mobile phones, fewer study hours in statistics, and intimate relationships with teachers are the significant factors of positive attitude in learning. Regression model II showed that low internet signal and low mental health are significant determinants of positive behavior in learning statistics online. Conclusively, students who have suitable gadgets for online learning and with good vibes with their teachers have good performance in class even if they study less, however, effective. Moreover, students with less distraction on social media and with mental stress, tend to deviate their attention in studying their lessons in statistics which positively increases their learning attitude and well-being.

1. Introduction

Isolation learning during the COVID-19 pandemic is a difficult scheme for many students especially in higher education since it causes them depression (Almarashdi & Jarrah, 2021). Learning at the college level without interaction with teachers and classmates results in boredom and psychological problems which affects their cognitive thinking (Amendola & et al., 2021). In fact, during distance (online) education teachers cannot deliver a quality lecture to their students because of barriers and they cannot monitor the real progress of their students (Casinilo & et al., 2022). In addition, students were not able to ask questions in real time and they were not properly guided regarding their lessons. In that case, students cannot properly grasp and their acquisition is not effective enough as opposed to traditional learning. Especially in higher education, wherein most of the parents/guardians are not able to help them with their academic tasks, hence, college students are on their own. According to Cassibba & et al. (2021) and Casinillo (2022a), teaching in college during the pandemic is very challenging concerning delivering lessons, particularly in the field of mathematics and statistics. In effect, learning mathematics and statistics at a distance is also difficult for many students in colleges and universities (Jazayeri & et al., 2022). Hence, students' attitudes toward learning were adversely affected which is a hindrance to their thinking skills. Garzon and Casinillo (2021) portrayed that if students' attitude is negative, then they have a poor understanding which makes them struggle to learn.

In the study of Jazayeri & et al. (2021), students of statistics courses during distance education were facing anxiety because of the difficulties in their learning environment. The anxiety they were experiencing is affecting their learning attitudes and they cannot perform well in class. According to Casinillo and Miñoza (2020), statistics subject is a tough course at the college level wherein students need to be equipped with mathematical concepts and good problem-solving skills. However, teachers cannot teach them well in the online learning setup, hence, students' learning attitudes are not enhanced to perform well. On the face of it, students were struggling to understand statistics lessons in which they have a poor perception of their learning ability which often leads to inactive students. According to Counsell and Cribbie (2020), a positive attitude in learning statistics is vital to developing creative minds and becoming active critical thinkers. Nevertheless, the study of Casinillo (2022b) depicted that students in distance education during the pandemic are not that creative and with lower enjoyment in learning statistics because of the unprecedented overtaking. As a result, students' attitude toward online learning has a lower level of engagement and involvement and poor enthusiasm due to anxiety. Henceforth, it is necessary to conduct a research study that involves students' attitudes to formulate a strategy that improves the learning skills of students amid online education. In particular, the subject statistics wherein students need to develop good cognitive thinking skills must be incorporated with the learning attitude which can be influenced by suitable teaching strategy in distance learning.

Sinaga and Pustika (2021) have explored the students' attitudes and they have found significant results that develop the teaching skills in online learning. Moreover, it is depicted in the study of Hooshyar & et al. (2021) that understanding the learning attitude is a big help in improving the acquisition and computational thinking of students. Although, students' behavior or attitude is well-studied in literature, however, research on students' attitude in

learning statistics online is scarce in the sense of the COVID-19 pandemic. Hence, the current study on students' statistics attitude is realized. The study is quite different from the existing studies in the body of literature since it involves statistical modeling of students' attitudes to capture its causal predictors during online learning. This study hopes to find an answer to improving the teaching strategies in statistics at distance education. The result of the study may give insight to statistics students on how to enhance their coping mechanism in learning at a distance. Plus, findings may also give useful information to develop or improve good study habits in the time of online education. Moreover, this article might be useful for other researchers in statistics education as a benchmark for future studies that involve learning attitudes and may contribute useful insights into education systems across the globe.

2. Research Objectives

The general objective of this article research is to develop a statistical model that will explain the students' attitudes toward learning statistics through the influencing factors in online learning. To achieve the goal of this article, the researchers sought the following specific objectives:

(1) To present a summary of students' profiles in a tabular form;

(2) To estimate the students' attitude toward learning statistics online; and

(3) To construct a regression model that captures the causal predictors of students' learning attitudes.

3. Conceptual Framework of the Study

A positive attitude toward learning makes the students active and interactive in class discussions which promotes good academic achievement (Code & et al., 2016). However, online learning during the COVID-19 pandemic has disrupted the positive attitude of students in learning due to limitations and problems in the classroom environment (Sinaga & Pustika, 2021; Casinilo & et al., 2022). Especially in learning statistics, students are having a hard time coping with the challenges and it hinders them from understanding their discussion online and learning activities (Macher & et al., 2012). Meanwhile, the study of Bustillo and Aguilos (2022) portrayed that the learning modality during the pandemic is not as effective as opposed to traditional one which contributes to the negative attitude of students. Alabekee & et al.(2015), and Miñoza and Casinillo (2022) portrayed that subjects that involve mathematics and statistics must involve focus and a positive attitude to think critically and this can be accomplished through effective teaching strategy that concerns interactive discussion.

In that case, this article explores the students' attitude influencing factors to find a remedy to improve their learning behavior in online learning. As Hooshyar & et al. (2021) depicted students' attitudes can affect the student's computational skills, hence, it is necessary to investigate ways to improve their cognitive attitude in learning statistics online. As predicted in the study by Casinillo (2022b), students' attitudes regarding creativity and enjoyment are influenced by their demographic and learning profile. Plus, the research study by Ismaili (2021) found that students' attitudes are governed by their learning experiences toward distance education as well as their struggles during the pandemic. Hence, the conceptual framework of

this article assumes that learning attitude in statistics online is affected by the profile and experiences of students during distance education. On the face of it, statistical models were constructed to capture the relationship of the said casual factors to students' attitudes, and useful insights were extracted.

3. Methodology

3.1 Research Design

This article employed the complex-correlational research as the design which aims to explain the students' attitude level and determine its influencing factors during distance education. The design adopted some standard descriptive methods to summarize the variables into a tabular presentation and used regression analysis in making an inference.

3.2 Respondents and Ethical Procedure of the Study

The study desired respondents of this study were the students at Visayas State University, a prestigious university in Leyte province of the Philippines. In particular, students who took up statistics courses during the conduct of the study during the online education Academic Year 2021-2022. This was the time of the first semester wherein the university did not allow physical classes but online. For the sake of homogeneity, students who took up "Engineering Data Analysis" were chosen in all these students are engineering. Since the population of these groups of students is just a few, the study employed complete enumeration as a sampling technique or considering all students in the classes which involved two sections. Before the survey was conducted, some formal and ethical considerations were made including formal consent to conduct, proper orientation to the respondents, and information about data privacy.

3.3 Data Collection and Research Instrument

The data collection involves Google Forms for the questionnaire survey because of the online education at VSU. So, every student that was involved in the survey study was sent a link to the Google form survey in their email address and messaged in their Facebook account. To ensure the participation of students, they were given incentive points that were part of their performance in the course. The students were given ample time to respond to the survey questionnaire and after that, the survey was closed. So, there are 129 students responded to the survey. After clearing the data and removing the incomplete responses and outliers, the study considered 127 students as participants. As for the data, the questionnaire has two parts. The first part involved the profile of students as follows: (1) age in years, (2) do you own a laptop? (yes or no), (3) number of hours in a week studying statistics course, (4) money spent on the internet (in Peso (PHP)), (5) residence (rural or urban), (6) sex of students, (7) household size (count), (8) internet signal strength (1 to 10 scaling), (9) anxiety level (1 to 10 scaling), (10) resilience level (1 to 10 scaling), (11) challenge level (1 to 10 scaling), (12) enjoyment level (1 to 10 scaling), (13) how conducive is the learning environment (1 to 10 scaling), (14) leisure time (1 to 10 scaling), (15) social relationship (family and teacher) (1 to 10 scaling), (16) health aspect (physical, emotional, and mental) (1 to 10 scaling). The mentioned variables were considered independent variables in the study. The second part served as the dependent variable in the study which is the students' learning attitude in statistics during online education. The

questions were adopted from the paper of Code & et al. (2016) and modified to suit at the current situation during the survey. This questionnaire follows a 5-point rating scale and it involved 32 questions with different categories as shown in Table 1 below.

Table 1. Students' attitude in the learning statistics questionnaire

Category	Question number
Confidence	1, 14, 17, 20
Growth mindset	5, 6, 22, 31
Persistence	8, 10, 24, 29
Answers	2, 7, 9, 16, 28, 30
Filter statement	19
Real-world	13, 15, 21
Interest	12, 26, 32
Sense making	3, 4, 11, 18, 23
No category	25, 27
Expert consensus	All except 19, 22, and 31

The said questionnaire has been validated by some experts who found that the questionnaire is valid for use and captures the students' well-being, attitude in learning, and experiences of students during distance education. Moreover, using Cronbach alpha, the questionnaire was known to be reliable which means it is consistent in that it has a scale reliability coefficient of 0.77 (Cronbach, 1951). Table 2 presents the different levels of perception attitude and its verbal description.

Table 2. Students' attitude perception scores and their verbal description

Attitude perception score	Response	Verbal description
1.00 - 1.80	Strongly Disagree	Very negative attitude
1.81 - 2.60	Disagree	Negative attitude
2.61 - 3.40	Neutral	Neutral attitude
3.41 - 4.20	Agree	Positive attitude
4.21 - 5.00	Strongly Agree	Very positive attitude

4. Analysis of the Survey Data

The gathered survey data were then applied to coding (assigning value to a response) and immediately formatted to Excel and fitted to the statistical program (STATA version 14.0) for accurate computation. The first part of the analysis is to describe the data, hence, some statistical measures were then computed such as counts/frequency, percentages, minimum value, maximum value, mean (M), standard deviation (SD), and coefficient of variation (CV) as a measure of the consistency of the data. In capturing the statistically significant factors of students' attitudes in learning statistics, multiple linear regression was employed given ordinary least squares (OLS). In that case, students' attitude perception score was treated continuously. The empirical linear regression model is given as follows:

$$A_i = \lambda_0 + \lambda_1 X_{i1} + \lambda_2 X_{i2} + \cdots + \lambda_k X_{ik} + \varepsilon_i \qquad (1)$$

where A_i is the students' attitude perception score, $i = 1, \ldots, n$ and $n = 127$ (students who are considered as respondents), λ_j ($\forall j \in \{0, 1, \ldots, k\}$) are the parameters and k refers to the number of predictors, X_{ij} ($\forall j \in \{1, \ldots, k\}$) are the independent variables in the model, and ε_i is the remaining random error in the regression model (1). Post-estimation analyses (diagnostic tests) were also done to ensure valid results in the regression model and tested at standard statistical level of significance. All computations were presented in a tabular form and interpreted accordingly.

5. Research Results

5.1 Descriptive Statistics

As can be gleaned in Table 3, the average age of students was 19.97 (SD=0.89) years old wherein the oldest is 23 years old and the youngest is 18 years old. Most of them (83%) were using laptops as their online gadget and only 17% were using mobile phones. On average, these students were studying statistics lessons for about 6.85 (SD=9.72) hours within a week and spending PHP 235.82 (SD=206.33) for internet load weekly. Only 26% of these students were living in urban places and dominant (74%) of them were residing in rural areas. Plus, dominant (62%) of these students were female and about 38% of them were male. On average, the student's household size was close to 7 (SD=1.91). Approximately, students rated their internet signal strength as 5.48 (SD=1.96) out of 10 and their anxiety level was about 7.18 (SD=1.87) out of 10.

The resilience level of these students in learning statistics is 6.45 (SD=1.55) out of 10 while they rated their experience as 7.9 (SD=2.19) out of 10 as a level of challenge. Moreover, they rated 5.76 (SD=1.97) out of 10 as their level of enjoyment in learning statistics and 5.61 (SD=2.31) out of 10 as their rate of how conducive their learning environment was at their respective homes. Students have rated their leisure time as 6.62 (SD=2.49) out of 10. As for their social relationship, their family was rated as 8.52 (SD=1.91) out of 10 and their statistics teacher was rated as 6.19 (SD=1.84) out of 10. Furthermore, in their health aspect, physical was rated as 6.09 (SD=2.25), emotional was rated as 5.29 (SD=2.38), and mental was rated as 4.79 (SD=2.30) out of 10.

Table 3. Summary of students' profile

Students' profile	Mean	Std. Dev.	minimum	maximum
Age in years[a]	19.97	0.89	18	23
Having laptop[b]	0.83	0.38	0	1
Hours in studying statistics per week[a]	6.85	9.72	1	70
Money spent for internet[c]	235.82	206.33	20	1400
Urban residence[b]	0.26	0.44	0	1
Female[b]	0.62	0.49	0	1
Household size[a]	5.65	1.91	2	13
Internet signal strength[d]	5.48	1.96	1	10
Anxiety level[d]	7.18	1.87	1	10
Resilience level[d]	6.45	1.55	2	10

Students' profile	Mean	Std. Dev.	minimum	maximum
How challenging is learning statistics[d]	7.90	2.19	2	10
How enjoyable is learning statistics[d]	5.76	1.97	1	10
How conducive is the learning environment[d]	5.61	2.31	1	10
Leisure time[d]	6.62	2.49	1	10
Social relationship with family[d]	8.52	1.91	2	10
Social relationship with teacher[d]	6.19	1.84	1	10
Physical health[d]	6.09	2.25	1	10
Emotional health[d]	5.29	2.38	1	10
Mental health[d]	4.79	2.30	1	10

Note: a - count; b - dummy variable; c - Philippine peso (PHP); d - 1 to 10 scaling.

Learning Attitude

It is shown in Table 4 that no students have a "very negative attitude" in learning statistics online amid the pandemic and there are only 2.36% of them had a "negative attitude". Dominant (82.68%) of these students are facing a "neutral attitude" or are not showing any emotions towards their learning experience in statistics online education. On the other hand, there were 13.39% of the students have shown a "positive attitude" towards learning statistics online and only 1.57% of them have experienced a "very positive attitude". On average, the student's attitude perception score is 3.14 (SD=0.35) which can be interpreted as a "neutral attitude" based on Table 2.

Table 4. Students' attitude level in learning statistics online.

Attitude level	Frequency	Percentage (%)
Very negative attitude	0	0.00
Negative attitude	3	2.36
Neutral attitude	105	82.68
Positive attitude	17	13.39
Very positive attitude	2	1.57
Mean (±Std. Dev.)	**3.14 (±0.35)**	
Overall description	**Neutral Attitude[a]**	

Note: a - See Table 2 for details.

Regression models for students' learning attitude

The first regression model in Table 5 was subjected to diagnostic tests to ensure the validity of its results (Mátyás & Sevestre, 2013). It was found that the residuals of the model were not normally distributed using the Shapiro-Wilk W test (W=0.934, p-value<0.001). However, based on the kernel density graph of the residuals, it is shown that it almost follows a normal distribution as shown below (Figure 1).
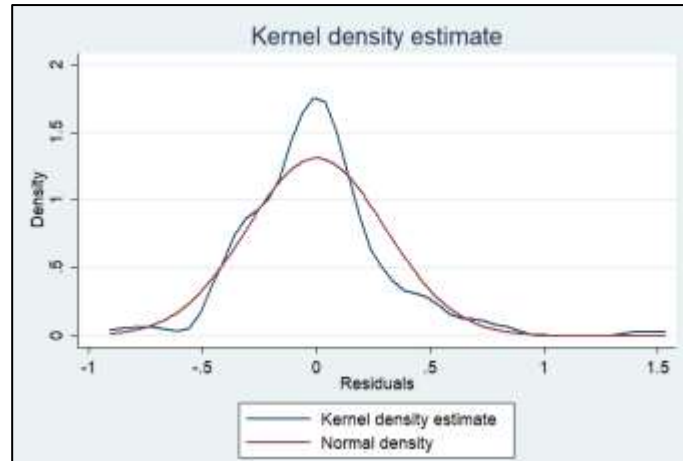
Figure 1. Kernel density estimate for residuals in model I.

In addition, the first model is in the absence of a multicollinearity problem since the variance inflation factor (VIF) is lower than 10 (i.e., VIF=1.26<10) and this indicates that the independent variables are not correlated to each other (Allison, 2012). Regarding the Ramsey RESET test, the regression model was detected to have an omitted variable bias (F=6.86, p-value<0.001). Moreover, because of the Breusch-Pagan test, the variances of regression model I are known to be heteroscedastic (X^2=11.33, p-value<0.01) which indicates that they are dispersed. Hence, the regression model was fixed by robust standard errors using the robust command in STATA to correct its bias results. The first model is significant (F=1.85, p-value=0.049) at a 5% level and has a coefficient of determination of 0.225, which indicates that there are significant predictors that govern the students' attitude in learning statistics during distance education. As can be gleaned in Table 5, the following independent variables are significant: having a laptop (p-value=0.02), number of hours in a week studying statistics course (p-value=0.01), and social relationship with statistics teacher (p-value=0.009). However, the following independent variables in model I are not significant: age in years (p-value=0.29), money spent on the internet (p-value=0.90), residence (p-value=0.13), sex of students (p-value=0.60), household size (p-value=0.42), how conducive is the learning environment (p-value=0.34), leisure time (p-value=0.64), social relationship with family (p-value=0.58), and physical health aspect (p-value=0.33).

Table 5. Regression model I: Factors affecting learning attitude in statistics

Predictors of Learning Attitude	Model I		
	Coefficient	*Std. Error*	*p-value*
Constant	2.493***	0.752	0.001
Age in years[a]	0.034[ns]	0.032	0.290
Having laptop[b]	-0.229**	0.097	0.020
Hours in studying statistics per week[a]	-0.009***	0.004	0.010
Money spent on internet[c]	0.011[ns]	0.082	0.898
Urban residence[b]	0.118[ns]	0.076	0.126
Female[b]	0.033[ns]	0.064	0.603
Household size[a]	0.013[ns]	0.016	0.420

Predictors of Learning Attitude	Model I		
	Coefficient	*Std. Error*	*p-value*
How conducive is learning environment[d]	-0.012[ns]	0.013	0.335
Leisure time[d]	0.007[ns]	0.015	0.642
Social relationship with family[d]	-0.011[ns]	0.019	0.581
Social relationship with teacher[d]	0.048***	0.018	0.009
Physical health[d]	-0.017[ns]	0.018	0.329
Number of Participants	127		
F-computed	1.850**		
p-value	0.049		
The goodness of fit (R^2)	0.225		

Note: a - count; b - dummy variable; c - Philippine peso (PHP); d - 1 to 10 scaling; ns-not significant; ** - significant at 5% α level; *** - highly significant at 1% α level.

As for the second statistical model shown in Table 6, it also underwent some diagnostic tests to ensure the validity of the findings (Mátyás & Sevestre, 2013). First, it was revealed that the residuals of the second model were not also normally distributed using the Shapiro-Wilk W test (W=0.915, p-value<0.001). Again, based on the kernel density estimate, it is presented that the residuals are close to normal distribution compared to actual normal density as shown in the figure below (Figure 2).
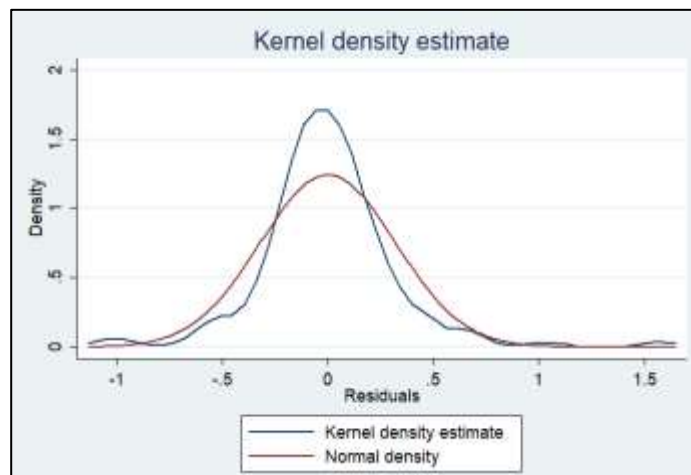

Figure 2. Kernel density estimate for residuals in model II.

In addition to that, the second regression model is shown to be in the absence of multicollinearity trouble based on the variance inflation factor (VIF) since it is lower than 10 (i.e., VIF=1.88<10) and this implies that the predictor variables are not associated (Allison, 2012). Given the Ramsey RESET test, the second regression model was portrayed to have no omitted variable bias (F=1.13, p-value=0.339) so far. Furthermore, using the Breusch-Pagan test, the variances of the second regression model are shown to be heteroscedastic (X^2=17.95, p-value<0.01) which means that they are scattered in the unequal scenario. Therefore, the second regression model was corrected by the robust standard errors. The second model is also significant at a 5% level with a coefficient of determination of 0.139. This goes to infer that there are variables that influence the students' learning attitude in statistics online. The

significant factors are as follows: internet signal strength (p-value=0.021) and mental health (p-value=0.087). Meanwhile, the variables that are not significant in the second model are as follows: anxiety level (p-value=0.14), resilience level (p-value=0.86), challenge level (p-value=0.72), enjoyment level (p-value=0.96), and emotional health aspect (p-value=0.13).

Table 6. Regression model II: Factors affecting learning attitude in statistics

Predictors of Learning Attitude	Model II		
	Coefficient	*Std. Error*	*p-value*
Constant	3.171***	0.264	<0.001
Internet signal strength[d]	-0.038**	0.016	0.021
Anxiety level[d]	0.022[ns]	0.015	0.143
Resilience level[d]	-0.003[ns]	0.016	0.858
How challenging is learning statistics[d]	0.007[ns]	0.021	0.721
How enjoyable is learning statistics[d]	0.001[ns]	0.016	0.957
Emotional health[d]	0.053[ns]	0.034	0.127
Mental health[d]	-0.064*	0.037	0.087
Number of Participants	127		
F-computed	2.74**		
p-value	0.011		
The goodness of fit (R^2)	0.139		

Note: a - count; b - dummy variable; c - Philippine peso (PHP); d - 1 to 10 scaling; ns-not significant; * - significant at 10% α level; ** - significant at 5% α level; *** - highly significant at 1% α level.

6. Discussion

The result revealed that students were being challenged in learning statistics during the COVID-19 pandemic in the form of distance education. This finding is parallel to the study of Casinillo (2022a) which depicted that the level of challenge of statistics students is relatively high due to the unprecedented situations and outcomes. Similarly, Amendola & et al. (2021) portrayed that students during the pandemic are bombarded with stress and unprecedented problems in learning which make them challenged to understand their lessons. This also leads to a higher anxiety level in learning statistics wherein the students were uneasy and anxious about their lessons and activities due to the barriers and fewer interactions (Arribathi & et al., 2021; Bustillo & Aguilos, 2022). In the same manner, students were facing a low level of resilience because of a lack of experience in the online learning environment they were facing. They are having difficulty recovering and adjusting from the challenges that they are dealing with in their statistics studies. As a result, students have expressed that learning statistics is less enjoyable because it is now less creative and realistic in the sense of online education (Casinillo, 2022b). Another thing is that students' leisure activities were limited due to some health protocols during the pandemic and students are not psychologically enjoying their student life. According to Wang & et al. (2020), being a college student during the pandemic is boring and the problems in distance learning because they stress which hinders their well-being.

In addition, students' perception of their learning environment is relatively low because of some limitations and barriers that prevent their cognitive thinking from working well. Plus, students are experiencing a low relationship with their teachers because of less interaction which makes them uncomfortable in learning. Lederer & et al. (2021) portrayed that the online learning environment is inconvenient for many college students which results in low progress in their performance. Moreover, students during the pandemic have faced a poor health aspect regarding their mental, physical, and emotional health. In the study of Essadek and Rabeyron (2020), it was discovered that students during the pandemic are suffering from stress and depression which adversely affects their health and well-being. It is revealed that students have a neutral level of attitude which indicates that students have a moderate learning attitude and do not show much interest in their studies. Learning attitude refers to the behavior of students in the classroom that shows engagement, active involvement, and enthusiasm which is correlated to their academic achievement (Garzon & Casinillo, 2021). However, students in online learning do not show a positive attitude and active behavior due to the problems and unprecedented scenarios in the environment and it causes negative thinking towards learning statistics.

Ismaili (2021) portrayed that students in distance education do not possess a positive learning attitude since they are mentally stressed due to health and economic crises. Also, students were just doing their learning tasks on their own with very limited resources at their respective homes, hence, they felt isolated and depressed. The regression model (I) revealed that students who were just using mobile phones were possessing a positive attitude toward learning statistics online. This implies that students were engaging and actively participating in their lessons through mobile phones as opposed to students who were using laptops for online classes. Nikolopoulou (2022) portrayed that students can easily access and learn a variety of applications on their mobile phones which helps them in their studies. Mobile phones have a wide range of digital tools, search engines, and many features that can enhance online learning (Bacolod, 2022). Secondly, the model (I) revealed that students who were studying in fewer hour/s were more likely to have a positive learning attitude. This implies that studying for a long time does not produce good behavior in learning since it causes mental stress and depression during the pandemic. In the study of Boruchowicz & et al. (2022), there is a reduction of time in studying during the pandemic since students cannot focus on their learning due to some distractions. Plus, students have reduced their study time because they spend more time on social media and other websites that distract from their studies (Capinding, 2021). In that case, students were diverting their minds to some other things that prevented them from penetrating the stress of their lessons in statistics.

Moreover, the model (I) showed that students who have a closer relationship with their statistics teacher are more likely to have a positive attitude toward learning. Students that make a good vibe with their teacher feel comfortable and show active participation in the classroom discussion. According to Azizah (2022), the teacher's good and creative teaching strategy during the pandemic results in a relationship with students' interest and positive learning behavior. The second model (II) depicted that students with low internet signal strength are more likely to have a positive attitude in learning statistics. This implies that students who do not rely much on the internet do not experience more distractions, for instance, on social media. Students who were focusing on printed modules are engaging in their learning tasks which

shows positive behavior and good performance (De Aquino & et al., 2023). Furthermore, model (II) revealed that students with low mental health are more likely to experience a positive learning attitude. This inverse result implies that if students are adversely affected by the impact of the pandemic, students are devoting themselves to their studies to ease their minds from other problems. This finding is inconsistent with the study of Chrikov & et al. (2020) which stated that students during the pandemic were suffering from mental and anxiety disorders in which they cannot focus on their studies. Likewise, Savage & et al. (2020) portrayed that the mental well-being of students during the pandemic reduced which adversely affected their performance in class.

7. Conclusion and Recommendation

The main aim of this research article is to estimate the level of students' learning attitude in statistics under online education amid the pandemic and capture its various determinants. Results revealed that students are having a "neutral attitude" in learning statistics online amid the pandemic. This implies that students are negatively affected by some adverse factors of online learning including limitations of communication and interactions, real-time discussion, and anxiety, among others. This leads to low active involvement and engagement of students in the classroom environment in the form of online education. Based on the regression model (I), it is revealed that students who are using mobile phones as their tool in online learning, fewer study hours in statistics due to some barriers, and intimate relationships with teachers are the statistically significant factors of positive attitude in statistics online education. In conclusion, if the students have suitable gadgets for online learning, then they can actively participate and perform better in class. Plus, if the students have effective study habits and they have good communication with their teachers, then they can perform a good academic achievement in statistics online education. Meanwhile, the second regression model (II) depicted that a student's low internet signal and low mental health are significant factors of positive attitude in learning statistics. These inverse results indicate that the students with less distraction on social media and any other platform on the internet, and with mental stress and depression due to the impact of the pandemic, tend to divert and focus their attention on studying their lessons in statistics. In that case, students have positively increased their learning attitude and well-being in learning statistics by focusing on their studies instead of negative happenings during the pandemic. Hence, the study strongly suggests that teachers must encourage their students to concentrate on their lessons and actively participate in their assessment activities to enhance their involvement and cognitive attitude. Plus, it is recommended that statistics teachers portray a positive attitude that promotes a conducive distance learning environment to improve the students' well-being. As for future research, it is suggested that this study must be conducted at other universities and incorporate the teachers' perspective on students' attitudes in learning statistics online to gather richer information.

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