

Modeling Determinants of Challenge in Learning Statistics in Time of the COVID-19 Pandemic

Leomarich F. Casinillo
Department of Mathematics, Visayas State University
Baybay City, Leyte, Philippines



Article history:

Submitted: 30 May 2022
Revised: 11 July 2022
Accepted: 9 August 2022

Keywords:

Statistics education
Determinants of challenge
Learning statistics online
Statistical models
Engineering students
Philippines

Corresponding Author:

Leomarich F. Casinillo
leomarichcasinillo02011990@gmail.com

ABSTRACT. During the COVID-19 pandemic, there were a lot of challenges encountered by students in learning statistics online that affected their cognitive attitudes. This study aims to evaluate the different determinants that significantly influenced the engineering students' level of challenge in learning statistics in the new normal with the aid of a structured questionnaire by means of a Google form survey. Descriptive statistics and multiple linear regression analysis were employed to extract meaningful information from the gathered data. Results showed that the students' perception score for the level of challenge in learning statistics is 7.37 (1.99), which can be interpreted as "challenging." This implies that students face challenges as they learn statistics lessons amid the pandemic setup. The regression models constructed have revealed that "age", "sex", "learning environment", "money spent on internet load", "physical health", and "creativity of statistics lessons" are the significant causal factors of the level of challenge in learning statistics. Conclusively, statistics teachers must adjust and be considerate to their students in regard to their learning needs in line with the pandemic setup.

The government also must provide a budget for seminars and training to college teachers concerning distance education. Furthermore, it is recommended that statistics teachers must create an interesting learning environment to fully catch students' attention despite challenges.

1.0. Introduction

Statistics is one of the difficult subjects to teach during the COVID-19 pandemic due to its complexity and technicality. In fact, statistics education requires extensive monitoring by teachers to deliver the lessons properly. However, due to the adverse impact of the pandemic, education has abruptly shifted to online learning, wherein students and teachers are experiencing unprecedented situations (Kanneganti et al., 2020; Onyema et al., 2020). According to Dubey and Pandey (2020) and Casinillo et al. (2022), online education setup has many disadvantages such as barriers due to distance learning, low internet connection, anxiety, financial crisis, health risk, and lack of interaction, among others. On the face of it, the quality of teaching has been diminished because of some limitations in delivering the lessons (Cassibba et al., 2020). On the other hand, students also have difficulty understanding some statistics topics due to a lack of guidance from their teacher (Repedro & Diego, 2021). Henceforth, it is interesting to investigate students' experiences in learning statistics to suggest ways to improve the current situation in teaching-learning statistics amid the pandemic.

In the case of a State University in Leyte, Philippines, teachers, and students are experiencing some challenges in dealing with distance learning. Most of their students live in rural areas, where internet connection is relatively low as opposed to urban places in Leyte (Casinillo et al., 2022). On the face of it, teachers are mostly adopting an asynchronous learning modality wherein they use printed learning materials to deliver the lessons (Talimodao & Madrigal, 2021). In that case, students learn without proper guidance and teacher interaction. In the study of Casinillo and Miñoza (2020), most statistics students have difficulty accomplishing a good performance due to a lack of interest. This scenario is getting worst amid the COVID-19 pandemic since statistics teachers are having difficulty on how to present and explain the topics without face-to-face interaction. Irfan et al. (2020) depicted that the use of online learning has a lot of obstacles, such as how to keep track of the students' learning tasks in real-time and how to assess students' attained knowledge. Plus, in online learning, teachers cannot know the students' thinking about the lessons. Although distance learning helps



This article published by Philippine Social Science Journal (PSSJ) is licensed under a Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0). You are free to share (copy and redistribute the material in any medium or format) and adapt (remix, transform, and build upon the material). Under the following terms, you must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. You may not use the material for commercial purposes.

combat the spread of the virus, it is not efficient and effective as face-to-face learning due to its challenges (Agustina & Cheng, 2020). Hence, investigating the influencing factors of the level of challenge in learning statistics will somehow aid in finding solutions to increase the students learning ability amid the pandemic.

Several studies in the literature deal with learning statistics online. However, the determinants of challenge during the pandemic have never been focused on in detail. In addition, modeling the level of challenge and its determinants in learning statistics during the pandemic in rural areas in the Philippines has not been initiated. Hence, this research study that dealt with statistical modeling was realized. In specific, the study sought the succeeding objectives: (1) to summarize the engineering students' profile; (2) to measure the level of challenge in learning statistics; and (3) to develop a statistical model that elucidates the determinants of challenge in learning statistics amid the pandemic. The significance of this study is to recommend some policies that may improve the current learning process of statistics education. Additionally, the results of this study may suggest some information that may help students and teachers to improve their well-being as they deal with distance learning. Finally, this current research study may contribute to knowledge in the body of literature in relation to teaching and learning statistics amid the COVID-19 pandemic, which may serve as a benchmark for educators and social scientists.

2.0. Framework of the Study

One cannot deny that "Statistics" is one of the challenging subjects in pure sciences like engineering, which requires diligence, an analytical mind, problem-solving skills, logical thinking, and excellent study habits, among others (Miñoza & Casinillo, 2022). However, the said requirements are becoming a challenge for most statistics students because of the adverse impact of the COVID-19 pandemic. In that case, Agustina and Cheng (2020) stated that distance learning during the pandemic is ineffective and cannot obtain the desired results for students. It is worthy to note that the pandemic has affected household income, leading to monetary issues. Plus, some students cannot have good internet access because of technical problems (Irfan et al., 2020). As a result of the financial crisis, students cannot acquire suitable gadgets or technology as well as internet loads for educational purposes (Casinillo et al., 2022).

According to Almarshdi and Jarrah (2021), the paradigm shift during the COVID-19 pandemic has brought several challenges to students while learning online. The students' negative perception of online learning is significantly due to less interaction with teachers, which consider the most important way of imparting knowledge. Aside from that, students are hesitant to ask questions regarding the lessons because of inadequate experience with the online learning setup (Syafiq et al., 2021). In fact, students are having difficulties expressing their questions orally. Some of them are not sure of what they are talking about and are afraid to make mistakes in front of their teachers and classmates during online learning. Suprianto et al. (2020) found that students are less focused on studying their lessons at home because they are also occupied with household chores and other distractions during the pandemic. Consequently, the number of hours studying their lessons is adversely affected, which might result in low academic performance in statistics.

Another thing is that students' anxiety during the pandemic is relatively high compared to normal days due to mental and physical health crises (Islam et al., 2020). According to Baloran (2020), due to anxiety brought by the pandemic, students are unwilling to online-blended learning and resistant to the adoption of technology advancement. Additionally, access to social media and other networking platforms distracts their learning amid online education (Dontre, 2021; Casinillo et al., 2022). Ultimately, during the COVID-19 pandemic, good health is vital for students to focus on their studies (Zhai & Du, 2020; Ziols & Kirchgasser, 2021). In fact, the study by Casinillo et al. (2022) found that health is a significant predictor of the level of challenge in learning during the COVID-19 pandemic.

3.0. Methodology

Research Design. The research design of this current study is a complex correlational design that deals with multiple regression modeling that captures relationships among several variables. This design will elucidate the students' level of challenge in learning statistics online and its influencing determinants amid the unprecedented condition that focuses on a large cross-sectional data survey sample size. Additionally, some descriptive measures were used to summarize and describe the

different characteristics of the gathered variable data.

Respondents and Ethical Considerations. The study's target population was engineering students of Visayas State University (VSU), Baybay City, Leyte, who were enrolled in "Engineering Data Analysis" during the first semester of Academic Year 2021-2022. Since the number of students is just manageable for a survey, the study considered a complete enumeration process in determining the respondents. Additionally, the survey is online since the study is under the distance learning procedure brought by the COVID-19 pandemic. Before conducting the online survey, a formal letter was handed over to the head of the Department of Statistics for consent to conduct the survey. After the letter was approved, the list of engineering students who took up "Engineering Data Analysis" was asked to the two instructors handling this subject. Afterward, students were educated via Google Meet about the intention of the current study and informed that their participation in the survey is voluntary and not obligatory. They were also informed that no sensitive data would be gathered and used only for research purposes that follow Data Privacy Act or Republic Act 10173 in the Philippines.

Questionnaire and Data Collection. As for the instrument of this research study, a Google form questionnaire survey was utilized to gather the desired data. This online survey was sent to the respective email address of students and posted in the virtual classroom. The survey was open for the last month of the semester. To have a strong likelihood that students will respond to the survey, they are given additional points (or incentives) that are part of their final grade in the "Engineering Data Analysis" subject. After the given time interval, 129 engineering students answered the online survey. However, few students had extreme (outliers) answers. Hence, they were excluded from the participants. In that case, 125 students were being considered for the analysis.

The online survey consists of the demographic profile of engineering students, learning experience in statistics amid the pandemic, and level of different classification of challenges in learning statistics online. Hence, the survey questionnaire consists of the following information (independent variables): gender (0=female, 1=male), age of students (in years), the hometown of students (0=Rural, 1=Urban), household size, household assets (₱), monthly household income (₱), hours studying statistics (weekly), money (₱) spent for the internet load (weekly), hours studying statistics (weekly), money (₱) spent for the internet load (weekly), social relation (Scale of 1 to 10), and physical and mental health aspect (Scale of 1 to 10), how conducive to learn at home (Scale of 1 to 10), signal strength for internet (Scale of 1 to 10), learning anxieties (Scale of 1 to 10), and learning creativity (Scale of 1 to 10). As for the dependent variables, the survey contains the following information in learning statistics (classification of the challenge) adapted from the study of Casinillo et al. (2022) such as "difficultly" (Scale of 1 to 10), "logical" (Scale of 1 to 10), and "rewarding" (Scale of 1 to 10). The level of challenge is the mean average score of the three classifications of challenge. Furthermore, the dependent variables are standardized questions, resulting in a reliability coefficient of 0.91 using Cronbach's alpha (Cronbach, 1951). This implies that the three items of question are reliable. As for the interpretation, Table 1 shows the mean challenge perception score and its corresponding description (Casinillo et al., 2022).

Table 1. Perception scores and their description

Perception Score	Overall Response	Description
1.00 - 2.80	Strongly Disagree	Not Challenging
2.81 - 4.60	Disagree	Slightly Challenging
4.61 - 6.40	Neutral	Moderately Challenging
6.41 - 8.20	Agree	Challenging
8.21 - 10.00	Strongly Agree	Very Challenging

Data Analysis and Empirical Model. For data extraction, descriptive statistics such as mean (M), standard deviation (SD), coefficient of variation (CV), minimum (min) value, and maximum (max) value were employed in summarizing the survey data. As for the inferential statistics, multiple linear regression analysis was employed to elucidate the significant predictors of the level of challenge in learning statistics online. The linear regression or ordinary least square (OLS) regression model is given by:

$$Y_j = a_0 + a_1X_{j1} + a_2X_{j2} + \dots + a_pX_{jp} + e_j \quad (1)$$

where Y_i is the level of challenge in learning statistics online, $j=1,\dots,n$ and refer to the number of engineering students who participated in the survey, $a_i \forall i \in \{0,1,\dots,p\}$ are the parameters of the equation model (1) to be approximated and interpreted, $X_{it} (\forall t \in \{1,\dots,p\})$ are the predictor variables in equation (1), and ϵ_i is the random error in (1). As for the interpretation, $a_t (t \in \{0,1,\dots,p\})$ is the approximate change in the level of challenge in learning statistics online in every one unit change in the particular predictor variable $X_{it} (\forall t \in \{1,\dots,p\})$ while holding other predictors constant. To ensure the validity of the interpretation, the equation model (1) has been subjected to diagnostic tests such as the Breusch-Pagan test, Ramsey RESET test, multicollinearity test, and Shapiro-Wilk test. The calculation was done using STATA version 14 and tested at a 5% level.

4.0. Results and Discussion

Profile of Engineering Students

Table 2 presents the socio-demographic and learning profile of engineering students during the COVID-19 pandemic setup. Students’ age is close to 20.12 (1.50) years old, with a minimum of 18 years old and a maximum of 30 years old. About 39% of these students are male, and 61% are female. Dominantly, students live in rural areas (77%), and about 23% live in urban areas. On average, the number of family members is closed to 6 (1.92).

Regarding their home learning environment, students rated it 5.62 (2.30) on a scale of 1 to 10. This can be interpreted as a moderately conducive place for learning. Approximately, students study their lessons in statistics for about 6.89 (9.81) hours per week. In addition, on average, they spend about ₱235.17 (₱206.41) on the internet load in a week. The monthly family income of these students is approximately ₱20411.2 (₱15122.65), and their household assets are closed to ₱175528.80 (₱331729.10).

On average, internet signal strength is rated moderate ($M=5.46, SD=1.95$). This means that some students have difficulty navigating their lessons online due to internet problems, especially those living in rural areas. As a result, some students are anxious ($M=7.13, SD=1.89$) and uncomfortable learning their statistics lessons. On a scale of 1 to 10, about (2.55) was the perception score of students about their leisure time during the COVID-19 pandemic. Physical health was about 6.11 (2.25), and mental health was closed to 4.85 (2.35) out of 10 perception scores. This implies that students have fewer physical activities and experiencing mental stress due to anxiousness and challenges brought by the pandemic. Furthermore, the level of creativity in learning statistics online is about 6.10 (1.88) on a scale of 1 to 10. This implies that creativity is moderate because of barriers and limitations they have encountered amid the new normal.

Table 2. Engineering students’ profile (n=125).

Variables	M ± SD	min	max
Age of student (in years)	20.12±1.50	18	30
Male (dummy)	0.39±0.49	0	1
Urban (dummy)	0.23±0.42	0	1
Household size	5.63±1.92	2	13
How conducive to learn at home ^a	5.62±2.30	1	10
Hours studying Statistics (per week)	6.98±9.81	1	70
Money spent for internet load ^b (per week)	235.17±206.41	20	1400
Monthly Family Income ^b	20411.2±15122.65	1000	80000
Household assets ^b	175528.80±331729.10	200	2000000
Internet Signal ^a	5.46±1.95	1	10
Statistical Anxiety ^a	7.13±1.89	1	10
Leisure time ^a	6.58 ±2.55	1	10
Physical health ^a	6.11±2.25	1	10
Mental health ^a	4.85±2.35	1	10
Level of Creativity ^a	6.10±1.88	2	10

Note: a- Scale 1 to 10. , b - Philippine Peso (₱).

Challenge perception in learning Statistics online

On average, engineering students are experiencing difficulty (M=7.86, SD=2.28) in learning statistics online (Table 3). This implies that these students face limitations during online classes and obstacles in understanding their statistics lessons. Remote learning during the pandemic has a lot of barriers, especially in monitoring the students’ learning behavior (Irfan et al., 2020). Table 3 also shows that learning statistics at a distance is logical (M=7.29, SD=2.25). This implies that as they comprehend the topics in statistics, they are using their cognitive thinking often. Apparently, learning a logical subject can be a challenging experience. Although logical thinking of students is being used, it cannot be monitored properly by their teachers to enhance their reasoning in understanding the concepts in statistics due to limitations in online learning. In that case, students and teachers are challenged to communicate each other’s logical ideas. This is inconsonant to the findings of Casinillo et al. (2022) that learning amid the pandemic is logical and challenging.

Additionally, learning statistics online is considered rewarding (M=6.97, SD=2.09) based on Table 3. This goes to infer that because of a lot of hard work in accomplishing learning tasks and activities in remote learning, students are well satisfied once done. They can feel satisfaction in accomplishing their required assignments despite the challenges amid the unprecedented time (Kim & Park, 2021). Overall, students’ experience in learning statistics during the times of the COVID-19 pandemic setup is considered “Challenging” (M=7.37, SD=1.99) (Tables 1 and 3). This means that students are facing a big challenge in penetrating the lessons in statistics due to the barriers and limitations brought by the pandemic. Moreover, according to Nartiningrum and Nugroho (2021), teachers have difficulty maintaining a good learning process due to the health protocols of the COVID-19 pandemic. In that case, it is challenging for them to recognize the needs and concerns of students due to diversity and limited resources. As a result, the study of Agustina and Cheng (2020) reveals that online learning amidst the unprecedented time is not as effective as traditional face-to-face learning because of the challenges experienced by students and teachers.

Table 3. Classification of challenges in learning statistics online

Classification of challenge	M ± SD	CV (%)	Over-all Response ^b
Difficult ^a	7.86±2.28	37.29	Agree
Logical ^a	7.29±2.25	20.19	Agree
Rewarding ^a	6.97±2.09	25.76	Agree
Over-all Challenge Perception	7.37±1.99	27.00	Challenging

Note: a - Scale 1 to 10. , b - See Table 1 for details.

Linear Regression Models

The four multiple linear regression models shown in Table 4 have undergone a diagnostic test to ensure their validity in discussing the results. Firstly, it is found that the four models are heteroscedastic (p-value<0.05) regarding variances of residuals. In other words, the variances of residuals are not constant, or the residuals are scattered unequally (Mátyás & Sevestre, 2013). In that case, the models were fixed by robust standard errors except for Model IV. Secondly, using the Ramsey RESET test, the four models have no omitted variable bias (p-value>0.05). Thirdly, the four models are harmless in relation to multicollinearity problems since the variance inflation factor (VIF) does not equal or exceed 10 (Allison, 2012).

Lastly, the Shapiro-Wilk W test revealed that the residuals of the four regression models are not normal (p-values<0.05). Nevertheless, with the aid of Kernel density estimate graphs, the four models’ residuals are almost normal. Table 4 depicts that models I (F_c=9.50), II (F_c=9.18), and III (F_c=3.04) are significant at a 1% level, and Model IV (F_c=2.66) is significant at a 5% level. This implies that significant predictors influence the dependent variable (Level of challenge in learning statistics online). Also, models I and II have a coefficient of determination (R²) above 0.45. This means that the goodness-of-fit is sufficient in predicting the response variable. Whereas for Models III and IV, only 0.16 and 0.14 are the coefficient of determination, respectively, implying a weak goodness-of-fit for the models (Henseler et al., 2009).

Students’ age (significant at 10% level) has an inverse effect on the level of challenge in learning statistics (Table 4; Model IV). This implies that younger students are experiencing a higher level of challenge. This can be explained that younger age has less experience and is slower to simplify things than older students. This finding is in consonant with the study of Peng et al. (2019), which stated that

older students have more learning experience that improves their understanding in the acquisition of their lessons and tasks. In fact, experience is the best lesson in life that drives in accomplishing things despite obstacles.

Model IV reveals that male students are more likely to be challenged in learning statistics online, which is significant at the 10% level. This means that female students are more comfortable than male students in online learning. This result parallels the findings of Sarwar et al. (2010), who found that female students are more resilient than male students in relation to academic achievement. In addition, male students are more distracted by online games than female students (Chambliss et al., 2017). Hence, male students cannot focus on their learning activities in statistics, resulting in a challenging occurrence for a learner amid the pandemic. Results of Dontre (2021) and Bahagia et al. (2022) show that the impact of online games is adverse to students' learning ability since it causes laziness in studying their lessons.

A conducive learning environment (Models III & IV) at home during distance learning is a significant (p -value<0.05) determinant in the level of challenge in learning statistics (Table 4). If the students are comfortable at their study place, they can penetrate the learning activities in statistics. On the face of it, students can experience the difficult nature of the subject and its challenging statistics problems. They will also experience real-life technical activities that need logical concentration. Buba et al. (2020) stated that the new environment (online) in learning amid the pandemic provides new opportunities to be a creative and sustainable alternative strategy in education.

Table 4. Regression models for the level of challenge in learning statistics online and its influencing predictors.

Causal Factors	Multiple Linear Regression			
	Model I	Model II	Model III	Model IV
Age of student (<i>in years</i>)	-0.1355 ^{ns} (0.1809)			-0.2419* (0.1207)
Male (<i>dummy variable</i>)	0.1016 ^{ns} (0.2955)	-0.0127 ^{ns} (0.3040)	0.1758 ^{ns} (0.3865)	0.6526* (0.3724)
Urban (<i>dummy variable</i>)	-0.0079 ^{ns} (0.2811)		0.1620 ^{ns} (0.3705)	
Household size		0.0169 ^{ns} (0.0694)		0.0821 ^{ns} (0.0914)
How conducive to learn at home ^a		0.0815 ^{ns} (0.0693)	0.1977** (0.0853)	0.1884** (0.0797)
Hours studying Statistics (<i>per week</i>)			0.0067 ^{ns} (0.0188)	0.0202 ^{ns} (0.0182)
Money spent for internet load ^b (<i>per week</i>)	0.0013* (0.0007)	0.0014* (0.0008)	0.0022*** (0.0008)	
log (Monthly Family Income ^b +1)	0.4046 ^{ns} (0.4009)			
log (Household assets ^b +1)		0.1564 ^{ns} (0.1777)		0.2490 ^{ns} (0.2259)
Internet Signal ^a			0.0318 ^{ns} (0.0822)	0.0707 ^{ns} (0.0950)
Statistical Anxiety ^a	0.1092 ^{ns} (0.0869)			
Leisure time ^a			-0.0213 ^{ns} (0.0712)	
Physical health ^a	0.1063 ^{ns} (0.0694)	0.1544* (0.0890)	0.1733* (0.0883)	
Mental health ^a		-0.1048 ^{ns} (0.1023)		
Level of Creativity ^a	0.6149*** (0.0865)	0.5867*** (0.0973)		
Constant	2.8950 ^{ns} (4.4640)	1.7517 ^{ns} (1.1110)	4.5091*** (0.8108)	8.7857*** (2.7189)
Observations	125	125	125	125
F_{computed}	9.50	9.18	3.04	2.66
p-value	<0.001	<0.001	0.0039	0.0137
Goodness of fit (R²)	0.4615	0.4512	0.1631	0.1372

Note: a - Scale 1 to 10; b - Philippine Peso (₱); Standard errors are enclosed by parentheses; ns - not significant; * - significant at 10% α level; ** - significant at 5% α level; *** - significant at 1% α level.

Table 4 (Models I (significant at a 10% level), II (significant at a 10% level) & III (significant at a 1% level)) shows that money spent on internet load is influencing the level of challenge in learning statistics online. It is worth noting that the pandemic also involves an economic crisis that affects the household's income (Adhe et al., 2020). This goes to infer that students are anxious about the money they need for internet load so that they can attend the online statistics class. This result parallels the study of Casinillo et al. (2022), which also deals with online learning in mathematics. Apparently, it is difficult to miss statistics classes because of technicality, and it needs proper guidance from the teacher. In that case, students who miss classes will experience a challenging pace in catching up with their lessons.

In Model II (significant at a 10% level) and III (significant at a 10% level), it reveals that physical health is a predictor of challenge in learning statistics online (Table 4). It is worth noting that during the lockdown, due to the spread of COVID-19, physical activities like sports have been prohibited. So, without physical activity at their age level, students become stressed and depressed while learning (Vetter et al., 2018). Moreover, it is difficult for students if they cannot focus on their statistics classes and activities because of health conditions. As we all know, good physical health positively correlates to a sound mind or mental health (Melyk et al., 2021). In that case, students with good health can penetrate the learning task and the logical nature of statistics at the college level. Thus, a challenging learning experience exists.

Moreover, Table 4 also shows that the level of creativity in statistics contributes to the level of challenge in learning at the 1% level for both Models I and II. Creativity is where students look into creative ideas and explore new information with their cognitive skills (Doane, 2002). Statistics is not just theoretical but also involves exploring new techniques for solving statistical problems anchored on innovative thinking (Miñoza & Casinillo, 2022). Hence, the more creative the subject is, the more it is challenging and informative. Plucker et al. (2004) stated that creativity is an important aspect of learning to develop imaginative thinking and cognitive ideas. In the study by Katz-Buonincontro et al. (2017), it is found that engineering students' creativity is directly related to their field of interest. In other words, creativity and imagination are vital in the engineering discipline to create unique solutions to mathematical and statistical problems. However, during the pandemic, students are experiencing some barriers and limitations that may hinder their creative way of thinking. Hence, the challenging moment comes in.

5.0. Conclusion

In conclusion, engineering students face a "challenging" experience learning statistics online during the COVID-19 pandemic setup. Students have difficulty understanding the lessons due to some barriers and a lack of interaction with their teacher as they follow the health protocols. Although distance (online) learning helps the safety of students' and teachers' health, this mode of learning is not as effective as conventional (face-to-face) learning. Demographic profiles of students, such as "age" and "sex", are significantly influencing the level of challenge in learning.

Conclusively, a more experienced (older) student can easily adjust and adapt to the new normal, lessening the challenge level. Meanwhile, male students are more challenged than female students because of distractions such as online games, social media, online videos, and the likes. Additionally, students are uneasy about the financial aspect of acquiring internet load for their online classes and other expenses they need for their studies. Physically healthy students are more focused and penetrating to statistics lessons. Hence, students who experience challenges in statistics activities are physically active to participate in the logical learning task in the subject.

Moreover, if the Statistics subject is more creative amid the pandemic, students are experiencing more challenges due to some barriers and limitations in online learning. Hence, it is recommended that teachers must provide learning modules for students who cannot attend an online class that is parallel to their real-time lecture-discussion. Teachers must also cultivate the students' interests in learning statistics by giving realistic and enjoyable learning activities to catch their attention. In addition, teachers must show a good personality and be considerate to their students to cope with stressful learning experiences amid the pandemic. Moreover, to improve the higher educational system in the country while facing the pandemic, the government must allocate a budget for appropriate seminars, workshops, and training for college teachers concerning the online class. As for future studies, it is necessary to model the factors of students' level of resilience and anxiety to strengthen the current result of this study.

6.0. Declaration of Conflicting Interest

There is no potential conflict of interest was reported by the author.

7.0. Funding

This study has no sources of funding to report.

8.0 Acknowledgment

The author would like to express humble gratitude to *Meralyn R. Lebante* and *Paulo G. Batidor* of the Department of Statistics, Visayas State University, for their help in data collection. Moreover, the author would like to extend his thankfulness to the reviewers for their valuable comments and suggestions in improving this paper.

REFERENCES

- Adhe, K. R., Maulidiya, R., Al Ardha, M. A., Saroinsong, W. P., & Widayati, S. (2020). Learning during the Covid-19 pandemic: Correlation between income levels and parental roles. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(1), 293-302. <https://doi.org/10.31004/obsesi.v5i1.554>
- Agustina, P. Z. R., & Cheng, T. H. (2020). How students' perspectives about online learning amid the COVID-19 pandemic?. *Studies in Learning and Teaching*, 1(3), 133-139. <https://doi.org/10.46627/silet.v1i3.46>
- Allison, P. D. (2012). *Logistic regression using SAS: Theory and application*. SAS Institute.
- Almarashdi, H., & Jarrah, A. M. (2021). Mathematics distance learning amid the COVID-19 pandemic in the UAE: High school students' perspectives. *Online Submission*, 20(1), 292-307. <http://ijlter.org/index.php/ijlter/article/view/3201>
- Bahagia, B., Wibowo, R., Muniroh, L., Al Wahid, A., Rizkal, R., Noor, Z. M., & Halim, A. K. (2022). The impact of playing games and the role of parents to control student behaviour in online learning from a teacher's perspective amid pandemic Covid-19. *Jurnal Basicedu*, 6(3), 5320-5328. <https://doi.org/10.31004/basicedu.v6i3.2445>
- Baloran, E. T. (2020). Knowledge, attitudes, anxiety, and coping strategies of students during COVID-19 pandemic. *Journal of Loss and Trauma*, 25(8), 635-642. <https://doi.org/10.1080/15325024.2020.1769300>
- Buba, U., Suleiman, L., Adamu, A. L., & Idris, A. (2020). virtual learning environment: a sustainable alternative strategy for teaching business education amid Covid-19 pandemic. *ATBU Journal of Science, Technology, and Education*, 8(4), 146-161.
- Casinillo, L. F., Casinillo, E. L., Valenzona, J. V., Almonite, M. R. C., & Valenzona, D. L. (2022). How challenging it is to learn mathematics online. *Philippine Social Science Journal*, 5(1), 80-89. <https://doi.org/10.52006/main.v5i1.447>
- Casinillo, L. F., & Miñoza, S. B. (2020). The suitability of students in Bachelor of Science in Statistics (BSS) program. *Journal of Education Research and Evaluation*, 4(4), 343-351. <http://dx.doi.org/10.23887/jere.v4i4.29217>
- Cassibba, R., Ferrarello, D., Mammana, M. F., Musso, P., Pennisi, M., & Taranto, E. (2020). Teaching mathematics at a distance: A challenge for universities. *Education Sciences*, 11(1), 1-20. <https://doi.org/10.3390/educsci11010001>
- Chambliss, C., Gartenberg, C., Honrychs, D., Elko, M., Match, R., McGill, S., & Boss, R. (2017). Distracted by binge-watching: Sources of academic and social disruption in students. *ARC Journal of Pediatrics*, 3(1), 14-17. <https://www.joseheras.com/pdfs/ajpd/v3-i1/4.pdf>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334. <https://doi.org/10.1007/BF02310555>
- Doane, G. H. (2002). In the spirit of creativity: The learning and teaching of ethics in nursing. *Journal of Advanced Nursing*, 39(6), 521-528. <https://doi.org/10.1046/j.1365-2648.2002.02320.x>
- Dontre, A. J. (2021). The influence of technology on academic distraction: A review. *Human Behavior and Emerging Technologies*, 3(3), 379-390. <https://doi.org/10.1002/hbe2.229>
- Dubey, P., & Pandey, D. (2020). Distance learning in higher education during a pandemic: Challenges and opportunities. *The International Journal of Indian Psychology*, 8(2), 43-46. <https://doi.org/10.25215/0802.204>
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *New challenges to international marketing*. [https://doi.org/10.1108/S1474-7979\(2009\)0000020014](https://doi.org/10.1108/S1474-7979(2009)0000020014)
- Irfan, M., Kusumaningrum, B., Yulia, Y., & Widodo, S. A. (2020). Challenges during the pandemic: Use of e-learning in mathematics learning in higher education. *Infinity Journal*, 9(2), 147-158. <https://doi.org/10.22460/infinity.v9i2.p147-158>
- Islam, M. A., Barna, S. D., Raihan, H., Khan, M. N. A., & Hossain, M. T. (2020). Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: A web-based cross-sectional survey. *PLoS one*, 15(8). <https://doi.org/10.7910/DVN/N5BUJR>

- Kanneganti, A., Sia, C. H., Ashokka, B., & Ooi, S. B. S. (2020). Continuing medical education during a pandemic: An academic institution's experience. *Postgraduate Medical Journal*, 96(1137), 384-386. <http://dx.doi.org/10.1136/postgradmedj-2020-137840>
- Katz-Buonincontro, J., Hass, R. W., & Friedman, G. (2017). "Engineering" student creativity in a probability and statistics course: Investigating perceived versus actual creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 11(3), 295-308. <https://doi.org/10.1037/aca0000118>
- Kim, S. H., & Park, S. (2021). Influence of learning flow and distance e-learning satisfaction on learning outcomes and the moderated mediation effect of social-evaluative anxiety in nursing college students during the COVID-19 pandemic: A cross-sectional study. *Nurse Education in Practice*, 56, 103197. <https://doi.org/10.1016/j.nepr.2021.103197>
- Mátyás, L., & Sevestre, P. (Eds.). (2013). *The econometrics of panel data: Handbook of theory and applications* (Vol. 28). Springer Science and Business Media.
- Melnyk, B. M., Tan, A., Hsieh, A. P., Gawlik, K., Arslanian-Engoren, C., Braun, L. T., Dunbar, S., Dunbar-Jacob, J., Lewis, L., Millan, A., Orsolini, L., Robbins, L. B., Russell, C. I., Tucker, S., & Wilbur, J. (2021). Critical care nurses' physical and mental health, worksite wellness support, and medical errors. *American Journal of Critical Care*, 30(3), 176-184. <https://doi.org/10.4037/ajcc2021301>
- Miñoza, S. B., & Casinillo, L. F. (2022). Profiling Bachelor of Science in Statistics (BSS) students under the open enrolment policy. *International Journal of Indonesian Education and Teaching*, 6(1), 1-24. <https://doi.org/10.24071/ijiet.v6i2.3723>
- Nartiningrum, N., & Nugroho, A. (2021). English teachers' perspectives on challenges, suggestions, and materials of online teaching amidst the global pandemic. *Indonesian Journal of English Education*, 1(1), 108-126. <https://doi.org/10.15408/ijee.v1i1.17886>
- Onyema, E. M., Eucheria, N. C., Obafemi, F. A., Sen, S., Atonye, F. G., Sharma, A., & Alsayed, A. O. (2020). Impact of Coronavirus pandemic on education. *Journal of Education and Practice*, 11(13), 108-121. <https://doi.org/10.7176/JEP/11-13-12>
- Peng, P., Wang, T., Wang, C., & Lin, X. (2019). A meta-analysis on the relation between fluid intelligence and reading/mathematics: Effects of tasks, age, and social economic status. *Psychological Bulletin*, 145(2), 189-236. <https://doi.org/10.1037/bul0000182>
- Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why isn't creativity more important to educational psychologists? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist*, 39(2), 83-96. https://doi.org/10.1207/s15326985ep3902_1
- Repedro Jr, R. E., & Diego, C. V. (2021). Attitudes toward statistics and statistical literacy of public senior high school students. *Philippine Social Science Journal*, 4(3), 48-56. <https://doi.org/10.52006/main.v4i3.399>
- Sarwar, M., Inamullah, H., Khan, N., & Anwar, N. (2010). Resilience and academic achievement of male and female secondary level students in Pakistan. *Journal of College Teaching and Learning*, 7(8), 19-24. <https://doi.org/10.19030/tlc.v7i8.140>
- Suprianto, S., Arhas, S. H., Mahmuddin, M., & Siagian, A. O. (2020). The effectiveness of online learning amid the COVID-19 pandemic. *Jurnal Ad'ministrare*, 7(2), 321-330. <https://doi.org/10.26858/ja.v7i2.16441>
- Syafiq, A. N., Rahmawati, A., Anwar, A., & Oktaviana, T. (2021). Increasing speaking skills through YouTube videos as English learning material during online learning in pandemic Covid-19. *Elsya: Journal of English Language Studies*, 3(1), 50-55. <https://doi.org/10.31849/elsya.v3i1.6206>
- Talimodao, A. J. S., & Madrigal, D. V. (2021). Printed modular distance learning in Philippine public elementary schools in the time of COVID-19 pandemic: Quality, implementation, and challenges. *Philippine Social Science Journal*, 4(3), 19-29. <https://doi.org/10.52006/main.v4i3.391>
- Vetter, M., O'Connor, H., O'Dwyer, N., & Orr, R. (2018). Learning "math on the move": effectiveness of a combined numeracy and physical activity program for primary school children. *Journal of Physical Activity and Health*, 15(7), 492-498. <https://doi.org/10.1123/jpah.2017-0234>
- Zhai, Y., & Du, X. (2020). Addressing collegiate mental health amid COVID-19 pandemic. *Psychiatry Research*, 288, 113003. <https://doi.org/10.1016/j.psychres.2020.113003>
- Ziols, R., & Kirchgasser, K. L. (2021). Health and pathology: A brief history of the biopolitics of US mathematics education. *Educational Studies in Mathematics*, 108, 1-20. <https://doi.org/10.1007/s10649-021-10110-8>

Additional Author's Information:

LEOMARICH F. CASINILLO
 leomarichcasinillo02011990@gmail.com
<https://orcid.org/0000-0003-3966-8836>