Student's Perception and Online Learning Outcome During COVID-19 Pandemic: An Academic Analysis in Wave 1 And Wave 2

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Abstract

The purpose of this paper is to understand and explore the perception of students regarding the online learning system during COVID-19 pandemic as the educational system covering the entire world was severely affected. COVID-19 demanded containment and enforced isolation that tremendously affected personal interaction of teachers and students. In theabsence of traditional classroom teaching and one-to-one interaction, computer-based learning has emerged as closest substitute for off-line teaching. The present study adopted quantitative approach for receiving responses using questionnaire method taking a sample of 230 responses using simple random sampling technique. Undergraduate students were targeted for selecting the samples that were using e-learning sources to complete their courses during lockdown. This research was conducted during May-July 2021. Data were analysed using SPSS software. The findings of the study reveal that online learning has significant effect on student interest during wave-1 (2020) and wave-2 (2021). It was found that there is a significant relation between online learning and student's interest in both wave-1 and wave-2. Based on the data analysis results, the study stated that student interest on online learning has significant impact in the time of COVID-19 crisis. In fact, online learning has emerged as a new way of improving the learning process. The findings of the study suggested that educational institution and policy makers should take initiatives regarding online learning process to enhance and make it better.

Keywords: Online learning, COVID-19, Wave-1, Wave-2 and Student's perception

Introduction

The COVID-19 pandemic has affected educational system worldwide. It has forced educational institutions to close, which has impacted over 90% of the world student's population. In order to continue teaching and learning practices in educational institution our education system has resorted to online mode of learning, which may be an imperfect yet quick solution to the crises.

The outbreak of the novel corona virus emerged in December 2019 in Wuhan, China (COVID-19) causing a significant and urgent threat to all. The emergence of the virus has so far disrupted economic, social, political as well as educational activities. The devastating effects of the pandemic on life, health, education and economy globally cannot be over-emphasized. It has affected more than 180 countries across the continents of Europe, Africa, Asia, North America, South America and Australia/Oceania (*McIntosh, 2020*). As a result of the devastating effect on the citizens by a steep increase in the cases ofCoronavirus around the world and the World Health Organization on March 11th 2020 declared the Coronavirus as a global pandemic.

The idea behind adopting online learning during the pandemic is that it provides great flexibility in teaching methodology, content management, a synchronous and asynchronous interaction between teachers and students.With the COVID- 19 a novel corona virus disease spreading across the globe, many countries have ordered closure of all educational institutes. Educational institutions have come to a functional stand still since they had to protect their students from viral exposures. In the beginning of February 2020, schools only in China and a few other affected countries were closed due to the proliferating contamination. However, by mid- March, nearly 75 countries have implemented or announced closer of educational institutions. According to UNESCO (2020) as lockdown and social distancing were the only ways to slowdown the spread of the COVID- 19 by breaking the chain of transmission.

Nevertheless, COVID- 19 has been a trigger for educational institutions worldwide to pursue creative approaches in a relatively short notice. During this time, most of the colleges had shifted from using blackboard till using online app such as Microsoft Teams, Zoom, Google meet and other online platforms.

The educational institutions were seeking stop-gap solutions to continue teaching, but it is important to note that the learning quality depends on the level of digital access and efficiency. The interaction of teaching and learning activities can be carried out from the distance with the help of internet and online media. However, this method can be difficult for those teachers who are specialized in conventional teaching and are uncomfortable to use electronic gadgets. Also, students may not feel serious in online teaching as teachers have little control in online teaching. Online learning has become a solution for the continuity of teaching and learning process during COVID-19 pandemic. Although online learning has various positive impacts, the shift to online education in areas needing more of practical knowledge creates new challenges. Very little information exists about the experiences of students regarding online classes. This knowledge is necessary to identify student's requirement during online learning to make this learning system beneficial for the students.

Now it has to be seen whether this online education option proves to be so successful and effective in student interest. A completely new system for teachers and students and poor internet connectivity is working as a barrier in online study. In this system educational institutions and teacher are provided online education to students through WhatsApp, zoom app, audio/video lecture, google meet and another medium. This study tried to evaluate the perception of student during pandemic in the academic year 2020-21.

There is uncertainty about the length of the pandemic and chances of reinfections, the social distancing can become a new normal. So, all the educational institutes need to be prepared to shift majority of the course content to online platforms and modify the course structure and curriculum suitably. The learning process is a continuous activity that involves the absorption of knowledge, skills, perspectives in attitude and behaviour by those who are learning. Students' perceptions of the learning process include delivery of material by lectures, the ability of students to absorb learning material during online classes and the results of the student learning evaluations.

Review of Literature

The current technological advancements allow us to employ several ways to design the content. It is very important to consider the preferences and perception of learning while designing the online classes courses to make the learning effective and productive. Preference of the learner is related to the readiness or willingness of the learner to participate in collaborative learning and the factors influencing the readiness for online learning.

Khan et. al., (2021) examined the student's perception and their readiness about online leaning during COVID-19 pandemic. This study was used university level students as sample respondents. The findings revealed that students are showing positive attitude towards e-learning and also accept the new learning system.

Almahasees & Qassem, (2021) aimed to evaluate the perception of faculty to accelerate the development of online learning during pandemic. The finding reveals that online learning on education was less effective than face to face learning. Furthermore, it stated that students were facing difficulties in online learning system including adopting to the online environment, lack of intention and motivation and problem in internet connection. They suggested blended learning approach.

Muthuprasad et. al., (2021) through light on agricultural student's perception and preference for various attributes of online classes which helpful to design effective online learning environment. The result stated that 70% of respondents were ready to opt for online classes to manage the curriculum during pandemic. The students were using or preferring smart phone for online learning during pandemic.

Bordoloi, R., Das, P., & Das, K. (2021) examined the perceptions of the teachers and students regarding the use of online or blended learning modes in teaching learning transactions. Also, the aim of the paper being to find out the prospects and challenges of giving online learning in a country like India during and post Covid-19 pandemic. A structural questionnaire and academic analytics approach have been used in this study. It was found that blended learning was significantly accepted in education in the context of the 21st century. The sample size was limited to 120.

Yeboah, R. (2022) defined how students are able to engage and use online learning platforms effectively. This study explored undergraduate students' knowledge, usage and challenges of using online learning platforms during the 2019-20 academic year. The data was collected by using questionnaire method and 538 students participated in the study. The study disclosed that almost half of students (45%) were not able to engage as well as not comfortable learn in online platforms during pandemic, because it was very new for many students. The major challenges faced by the students were access to internet data (61%), stable electricity (54%), technological equipment (47%), internet connectivity problems (77%) and location (47%) did not allow some students to participate well in the online learning platform.

Rouf, M. A., Hossain, M. S., Habibullah, M., & Ahmed, T. (2022) examined the perception of different groups including students, faculty and administrative officers related factors that influence the online learning for higher education in Bangladesh during covid-19 pandemic. A survey was conducted through a structured questionnaire and the sample size was restricted to 250 respondents including university students, faculty members and administrative officers. The findings of the study indicated that the online classes could be more challenging than traditional classroom. The major challenges were technology constraints, digital device, insufficient data plan to access study materials, poor learning environment, delayed response and teacher incapable to handle communication machines.

Maya, M., Anjana, V. M., & Mini, G. K. (2022) evaluated the college students prospective on the pedagogical shift from offline to online and vice versa learning modes during covid-19 pandemic in Kerala. A pre-test questionnaire was used in the study and quantitative data was analysed using descriptive statistics. It was found that online learning was increased technical skill, flexibility in study time, effectiveness of attending educational webinar. It was also found that the shift in offline to online learning and vice versa was perceived as a difficult process for the students to adjust the time.

Research Gap

The review of literature reveals that the studies are undertaken to identify student's perception and accepting online learning at the time of COVID-19 are found to be less or few.

Objectives of the Study

- To study the effectiveness of online leaning during the COVID-19 pandemic in both wave-1 and wave-2 for academic year 2020-21.

- To examinethe student's interest regarding online learning during COVID-19 at the time of wave-1 and wave-2.

As per the above objectives the study framed hypotheses are;

H_1: There is a significant relationship between online learning and students' interest during COVID-19 pandemic wave-1 in the year 2020.

H_1: There is a significant relationship between online learning and students' interest during COVID-19 pandemic wave-2 in the year 2021.

Methodology

Both Primary and Secondary sources were used in the study. For the purpose of the research, a well-structured Questionnaire was developed having closed-ended questions using based on the objectives & hypothesis of the study (*Kothari, 2009*). The respondents were the students who are using e-learning sources to complete their regular courses or skill development during lockdown. The responses were collected through mail and by-hand. A total of 251 questionnaires were distributed and sound responses were collected. Out of 251 responses, 21 responses were found to be invalid because of being partially filled. Hence, only 230 responses were taken in the study for the data analysis. The respondents were asked to respond to each items of the questionnaire using 5-point Likert Scale (1- Strongly Disagree to 5- Strongly Agree). The simple random technique used to collect the data from the respondents and the sample size was restricted to 230.The study areas was Berhampur city. The sample data originality and validity were checked using Cronbach's Alpha. Thereafter, the collection of data the perception of the respondents was carried out using factor analysis and multiple regression.

The respondents of the survey are the students who are actively using e-learning platforms for their regular course during COVID- 19 lockdown. The survey was conducted in the Berhampur city during May to July 2021. To examine the online learning benefits and to study the perception of students towards e-learning during this pandemic as well. SPSS software was used to test the study hypotheses.

Data Analysis and Interpretation

The data collected from the primary survey was analysed in various steps. First, the descriptive analysis based on the demographic information of the respondents was carried out. Second, the perception of students towards online learning during COVID-19 was identified using factor analysis. A Principal component analysis (PCA) method was conducted for extraction and varimax method for rotation. Third, regression method was used to determine the effect of factors on the perception of students in online class and test the hypotheses.

Demographical Profile of the Respondents

The demographic profile of the respondents was analysed through descriptive statistics. To fulfil the objectives a survey was conducted from different respondents in this study. The demographic variables were gender, age, marital status, area, etc shown in the table 1.

Table 1*Demographic profile of the respondents*

Demographic Variables	Frequency	Percent
Gender		
Male	37	16
Female	193	84
Age group		
Below 20 years	87	38
20-25 years	143	62
Marital Status		
Married	18	8
Unmarried	212	92
Residential Status		
Rural	75	33
Semi-urban	28	12
Urban	127	55

Source: Primary Data

The above table shows that out of the 230 respondents based on the filled questionnaire, female respondents were more than male respondents in the survey. Out of the sample, 16 percent were male and 84 percent were female. Furthermore, the highest 143 respondents belonged to the 20-25 age group, 87 respondents were second-highest comes under below 20 years age group.

Factor Analysis

The validity test of the instrument was calculated using Cronbach's α and Kaiser-Meyer-Olkin (KMO). It verified the sampling adequacy for the analysis. A principal component analysis was conducted on the 10 items which orthogonal rotation (varimax).

Cronbach's α was calculated to measure the consistency and reliability of the instrument. The Cronbach's α value 0.708 which is indicates that the instrument was considered reliable for the study (*Gupta & Dev, 2012*). Table 2 presents the reliability statistics of Cronbach's α. More specifically, it provided the following rule of thumb_> .7 is Acceptable (*George and Mallery, 200; Islam, Ahmd, & Razak, 2015*).

Table 2 *Case processing summary*

|	n	%
Case valid	230	100
Reliability statistics		
Cronbach's α	0.708	
No. of items	10	

Source: SPSS output

The KMO, the barely acceptable value is greater than .5 (*Kaiser, 1974*). For this study, the KMO value for the instrument was .753, which fell into the range good (*Hutcheson &Sotroniou, 1999*). This study observed that the sample size is adequate and confident for factor analysis. Similarly, Bartlett's test of sphericity measures the original correlation matrix is an identity matrix. P-valueis .000 which is less than .05 of the significance levels which indicates that correlation between items was sufficiently large for PCA. Hence, the instrument was acceptable for further study (*Gupta& Dev, 2012*). Table 2.1 demonstrates KMO and Bartlett's test of sphericity.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.753
Bartlett's Test of Sphericity	Approx. Chi-Square	667.178
	df	45
	Sig.	.000

Table 2.1KMO and Bartlett's Test

Source: SPSS output

Figure 1 *Screen plot*
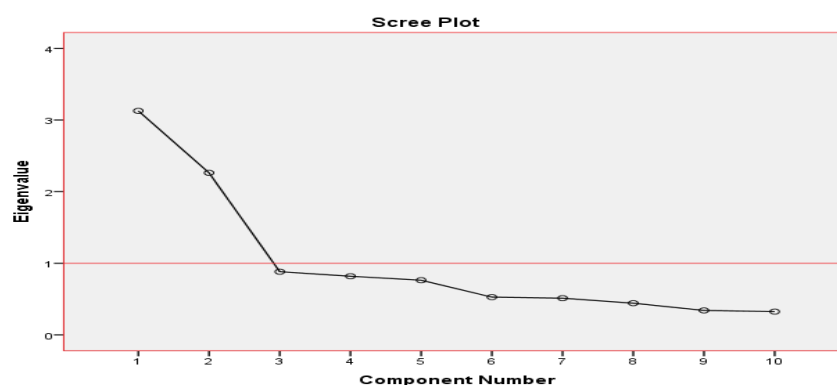
Table 2.2 Total variance explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.128	31.277	31.277	3.128	31.277	31.277	3.026	30.256	30.256
2	2.262	22.622	53.899	2.262	22.622	53.899	2.364	23.643	53.899
3	.882	8.818	62.717						
4	.819	8.187	70.904						
5	.763	7.628	78.532						
6	.527	5.271	83.803						
7	.512	5.122	88.925						
8	.442	4.424	93.348						
9	.341	3.409	96.757						
10	.324	3.243	100.000						
Extraction Method: Principal Component Analysis.									

Source: SPSS output

Table 2.2 reveals that two components were extracted elements. Two components have an eigenvalue greater than one and the total variance is equal to 53.899 which is worthy (*Phogat & Gupta, 2019*). The screen plot presents two factors that are extracted which indicate more than one.

Table 2.3 *Rotated Component Matrix*

	Component	
	1	2
AWS		.616
GON	.661	
IIC	.791	
IWS	.726	
DCF	.725	
COT	.744	
SADC	.427	
LA		-.593
COVID-2020		.766
COVID-2021		.835
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		

Source: SPSS output

Finally, two components took after rotation of the components matrix on the basis of varimax with Kaiser normalization rotation method (Table 2.3).

Multiple Regression Analysis

The study employed mulriple regression analysis to test the proposed hypotheses in this study. Therefore, a regression model generalise that underlying certain assumptions have been met.

The normality of residual is tested using histogram and normal probability plot in the regression analysis. Figure 2 shows the histogram graph. The histogram shows the shape of distribution. The histogram indicates that the curve is a perfect bell-shaped curve with only one peak and it looks like a normal distribution. The normality probability plot represents in

figure 3. In this plot the straight-line curve represents that the distribution was normal and all the points are laid on the straight line. This p-p plot reveals that the variables of the study are normally distributed which depicts that the assumption of normality is successfully met in the multiple regression analysis.

Figure 2 *Histogram and P-P Plot of wave - 1*
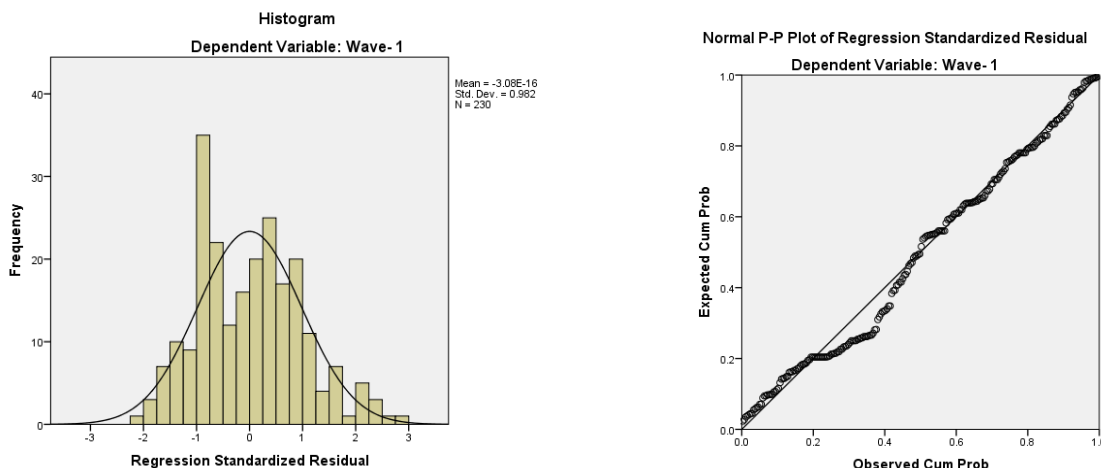
Figure 3 *Histogram and P-P Plot of wave - 2*
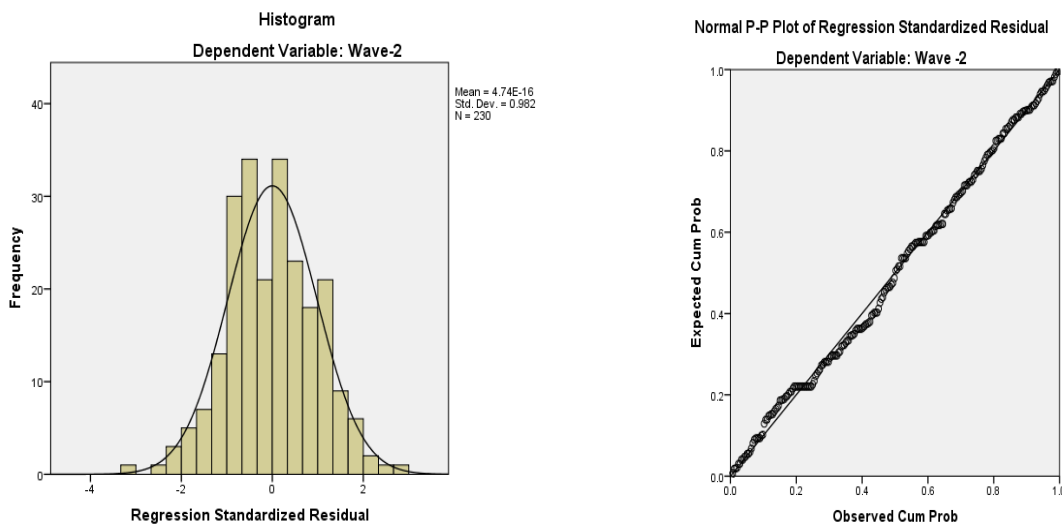
Table 3 Summary of Model 1 and Model 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.434ᵃ	.188	.159	1.250	1.869
2	.538ᵃ	.289	.263	1.162	1.794
a. Predictors: (Constant), LA, IIC, AWS, DCF, GON, SADC, COT, IWS					
b. Dependent Variable: Wave-1, Wave-2					

Source: SPSS output

Table 3.1 ANOVA (Model 1 & 2)

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	80.016	8	10.002	6.406	.000
1	Residual	345.050	221	1.561		
	Total	425.065	229			
	Regression	121.230	8	15.154	11.231	.000
2	Residual	298.201	221	1.349		
	Total	419.430	229			
a. Dependent Variable: Wave-1-2020, Wave-2-2021						
b. Predictors: (Constant), LA, IIC, AWS, DCF, GON, SADC, COT, IWS						

Source: SPSS output

Table 3.2 Coefficients of Model 1

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
	(Constant)	2.867	.442		6.492	.000		
	AWS	.293	.068	.273	4.300	.000	.908	1.101
	GON	-.036	.099	-.027	-.367	.714	.677	1.477
	IIC	.040	.123	.027	.321	.748	.513	1.951
1	IWS	-.067	.099	-.054	-.673	.502	.579	1.728
	DCF	-.024	.102	-.018	-.231	.817	.596	1.678
	COT	.264	.109	.186	2.430	.016	.628	1.591
	SADC	-.222	.094	-.174	-2.371	.019	.680	1.471
	LA	-.192	.092	-.154	-2.083	.038	.675	1.481
a. Dependent Variablewave-1 (2020)								

Source: SPSS output

Table 3.3 Coefficients of Model 2

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
	(Constant)	2.761	.410		6.727	.000		
	AWS	.320	.063	.301	5.057	.000	.908	1.101
	GON	.170	.092	.128	1.850	.066	.677	1.477
	IIC	.075	.115	.052	.655	.513	.513	1.951
2	IWS	-.196	.092	-.159	-2.128	.034	.579	1.728
	DCF	.071	.095	.055	.751	.453	.596	1.678
	COT	.177	.101	.125	1.752	.081	.628	1.591
	SADC	-.276	.087	-.218	-3.164	.002	.680	1.471
	LA	-.243	.085	-.196	-2.842	.005	.675	1.481
a. Dependent Variable: wave-2 (2021)								

Source: SPSS output

In the model 1 the dependent variable is wave-1 during 2020 and the indpendnet variables are AWS, GON, IIC, IWS, DCF, COT, SADC and LA. The summery of result presented in table 3. The value of R square .188. The Durbin-Watson

statistics value of this model is 1.87 is very close to 2 and it reveals that there is no autocorrelation. The coefficient of the model result depicted that VIF values are less than 10 and all the independent variables are linear in this model 1 (*Field, 2009*). The mulricollenierity and linearity assumption succsefuly met in the model 1.

The ANOVA ouput results shown in table 3.1, F-value 6.406 with p-value of .000 which is less than .05. The result disloses that the model is statistically singnificant. There is a significant relationship between online learning factor and student interest during wave-1 in the year 2020.

The β-value of the statistics result in the equation (1) defines in the model as given below:

$$Wave-1 = 2.867_0 + (-.293)_1 AWS_1 + (-.036)_2 GON_2 + .040_3 IIC_3 + (-.067)_4 IWS_4 + (-.024)_5 DCF_5 + .264_6 COT_6 + (-.222)_7 SADC_7 + (-.192)_8 LA_8 \dots\dots\dots\dots (1)$$

Table 3.2, the smaller *p*-valueand larger *t*-value of independent variable is the greater contribution in the model 1. The t-value of AWS was 4.3 and *p*-value *.000* (*p*-value < 0.001), COT t-value 2.43 and *p*-value .016 (*p*-value $< .05$), SADC t-value -2.37 and p-value .019 and LA t-value -2.08 and *p*-value .038 (*p*-value < 0.05) are all significant independent variables of wave-1 in the year 2020. AWS has high significant impact whereas DCF has less impact on wave-1. The standardise β-values provides a better and important independent variable of the financial constraints in the model. The highest standardise β-values of AWS and COT are .293 and .264. These two independent variables are importance in this model 1.

In the model 2 the dependent variable is wave-2 during 2021 and the indpendnet variables are AWS, GON, IIC, IWS, DCF, COT, SADC and LA. The summery of result presented in table 3. The value of R square .289. The Durbin-Watson statistics value of this model is 1.79 is very close to 2. The coefficient of the model result depicted that VIF values are less than 10.

The ANOVA ouput result presented in table 3.1, F-value is 11.21 with p-value of .000 which is less than .05. the result disloses that the model is statistically singnificant. There is a significant relationship between online learning factor and student interest during wave-2 in the year 2021.

The β-value of the statistics result in the equation (2) defines in the model as given below:

$$Wave-2 = 2.761_0 + .320_1 AWS_1 + .170_2 GON_2 + .075_3 IIC_3 + -.196_4 IWS_4 + .071_5 DCF_5 + .177_6 COT_6 + (-.276)_7 SADC_7 + (-.243)_8 LA_8 \dots\dots\dots\dots\dots\dots\dots (2)$$

AWS- acquainted with software	Wave-1 – student experience
GON-gaining of knowledge	Wave- 2 – student experience
IIC- interaction in class	
IWS- interaction with student class mates	
DCF- doubt clearing facility	
COT- communication of teacher	
SADC student activity during class	
LA- level of acceptance	

The t-value of AWS is 5.05 and *p*-value .000 (*p*-value < 0.001), SADC t-value -3.16 and *p*-value .002 (*p*-value $< .05$), LA t-value -2.84 and p-value .005 and IWS t-value -2.12 and *p*-value .034 (*p*-value < 0.05) are all significant independent variables of wave-2 in the year 2021. AWS has high significant impact whereas IIC has less impact on wave-2. The highest standardise β-values of AWS and COT are .320 and important independent variable in this model 2.

Findings and Conclusion

With efforts to prevent the spread of the novel coronavirus, the contours of education system are changing with online education becoming the primary means of instruction. University, colleges and other education institutions are shifting to online platforms to catch up with the curriculum. It may too early to say how students and teachers will cope

with online learning as they out the constraints, reorient to address them but the perception of students is an important consideration which the study has tried to document.

The findings of this study indicated that majority of the students evinced a positive attitude towards online classes in the pandemic. The online learning was found to be advantageous as it provided flexibility and convenience for learners.

They also indicated the need for interactive sessions with quizzes and assignments at the end of each class to optimise the learning experience. However, most students also reported that online classes could be more challenging than traditional classroom because of the technological constraints, delayed feedback and inability of the instructor to handle effectively the Information and Communication Technologies. Therefore, all these factors should be considered while developing an online course to make it more effective and productive for the learner.

This study showed that e-learning is a valuable method of teaching students. In the opinion of the respondents in our survey, e-learning is effective in increasing knowledge and is highly accepted. However, it is important not to focus only on increasing knowledge, but also on social skills. E-learning should not only be based on the delivery of content, but students should be able to work with the materials and receive feedback. Successfully implementing online learning into the curriculum requires a well-thought-out strategy and a more active approach.

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