Original Research Article

Impact of Challenges and Advantages of Online learning on the Academic Performance of Students in Higher Education Institution in Sultanate of Oman

Abstract
The COVID 19 pandemic has affected the entire education system and brought a new phase in education through e-learning. This study is aimed to identify the challenges and advantages of online learning on academic performance in higher education institution. The objectives are to analyse the challenges and advantages of online learning that impact on academic performance of students. A sample of 524 responses from University of Technology and Applied Sciences, Nizwa, Sultanate of Oman is collected for the study. The only challenge variable that is proved to have significant impact on student performance is inadequate lecturer explanations during the online class. The advantage of online learning that affects academic performance is the time benefit and cost effectiveness of online classes. The challenge variables influence only 6% on their academic performance. Similarly, the advantages of online learning contribute only 5% on the academic performance of students. The study concluded with suitable recommendations to improve the academic performance.
Key words: Online learning, challenges of online learning, advantages of online learning, academic performance.

Introduction
The global outbreak of the COVID-19 pandemic has spread worldwide, affecting almost all countries and territories. The outbreak was first identified in December 2019 in Wuhan, China. The COVID-19 pandemic has created the largest disruption of education systems, affecting nearly 1.6 billion learners in more than 200 countries. Closures of schools, institutions and other learning spaces have impacted more than 94% of the world's student population (Sumitra and Roshan, 2021). Education is the only industry that is completely transferred to online mode in most countries around the world. Online learning was the best solution for continuing education during the pandemic, especially in tertiary education (Mahyoob, 2020). Sultanate of Oman first declared closing of schools and institutions and reduction of business hours during the second week of March 2020.

Need of the study
COVID-19 pandemic has affected higher education institution, as it is among the most important service sectors and its students represent the potential future workforce. Regardless of their experience of e-learning platforms or ability to use these emerging information technologies in their education journey, the COVID-19 pandemic has tested the extent to which both academics and students are prepared to adopt and use these technologies in their online learning activities (Allam et. al. 2020). Lockdown and social distancing measures due to the COVID-19 pandemic have led to closures of schools, training institutes and higher education facilities in most countries. There is a paradigm shift in the way educators deliver quality education—through various online platforms. The online learning, distance and continuing education have become a panacea for this unprecedented global pandemic, despite the challenges posed to both educators and the learners. Transitioning from traditional face-to-face learning to online learning can be an entirely different experience for the learners and the educators, which they must adapt to with little or no other alternatives available. The education system and the educators have adopted "Education in Emergency" through various online platforms and are compelled to adopt a system that they are not prepared for. E-learning tools have played a crucial role during this pandemic, helping schools and universities facilitate student learning during the closure of universities and schools (Subedi et al., 2020).

Literature Review

Challenges of online learning

Broadly identified challenges with e-learning are accessibility, affordability, flexibility, learning pedagogy, life-long learning and educational policy (Murgatrotd, 2020). Many countries have substantial issues with a reliable Internet connection and access to digital devices. While, in many developing countries, the economically backward children are unable to afford online learning devices, the online education poses a risk of exposure to increased screen time for the learner. The level of academic performance of the students is likely to drop for the classes held for both year-end examination and internal examination due to reduced contact hour for learners and lack of consultation with Lecturers when facing difficulties in learning/understanding (Sintema, 2020). Many of these students have now taken online classes, spending additional time on virtual platforms, which have left children vulnerable to online exploitation. Increased and unstructured time spent on online learning has exposed children to potentially harmful and violent content as well as greater risk of cyberbullying. Majority of students do not have access to smartphones or TV at home in addition to poor Internet connectivity. There is no or less income for huge population due to closure of business and offices. The data package (costs) is comparatively high against average income earned, and continuous access to Internet is a costly business for the farming community. The Lecturers are in dilemma as to whom to listen to and which tools to adopt. Some think pre-recorded videos could help; however, this would restrict interactions. According to Emma and Elaine (2020), the more students miss the school, the worse their performance is. The two main tools for education available to children during the lockdowns have been remote and alternative learning and, at least technically, a homeschooling environment. Successful online learning thus requires that students (and teachers) be familiar and proficient in their uses of those devices for learning. Hjelsvold et al. (2020) investigated educators' feedback on the distance learning during the COVID-19 lockdown, as a result of a survey conducted on 303 university students and 56 educators in Norway. The study reported that short time and lack of ready resources were important barriers to sudden shift to distant learning. According to the report in Almalnews in Egypt (2020) results of the four surveys included the following: the majority of educational leaders endorsed online distant learning in higher education; Internet connectivity and weak IT skills are the most prominent difficulties of distance education in Egypt; and recorded lectures are the most plausible ways to deliver educational materials.

Advantages or opportunities of online learning

The homeschooling requires parents to support the students' learning academically and economically. Lecturers are obliged to develop creative initiatives that assist to overcome the limitations of virtual teaching. Lecturers are actively collaborating with one another at a local level to improve online teaching methods. There are incomparable opportunities for cooperation, creative solutions and willingness to learn from others and try new tools as educators, parents and students share similar experiences (Doucet et al., 2020). Many educational organizations are offering their tools and solutions for free to help and support teaching and learning in a more interactive and engaging environment. Online learning has provided the opportunity to teach and learn in innovative ways unlike the teaching and learning experiences in the normal classroom setting. The accessibility of online education globally, saving time, money, and efforts are advantages of online learning. In teaching, the lecture's recording is one advantage of online learning when students ask lecturers to record the classes. The lecturers are reviewing and preparing well for recording, which certainly improves teaching strategies and methods. Students can access the lectures anytime and can understand better (Mahyoob, 2020). Ng et al. (2020) aimed to serve a constructive purpose in the current COVID-19 crisis by presenting practice driven pedagogical strategies for online learning and teaching. They addressed the multitude of challenges faced by educators through the delivery of online instructional strategies for schools. They used a qualitative method of multiple case analysis to explore how three educators from primary, secondary, and tertiary institutes employed various strategies to offer learning and teaching as usual. Results indicated that meaningful cognitive activities rely on teachers' leading role to build a blended approach that combines the advantages of asynchronous and synchronous methods in order to facilitate social interaction among students. Furthermore, educators

are likely to perceive three non-teaching challenges on a rapid blended transition of the learning – digital divide, data privacy, and professional leadership.

Statement of the problem

The Corona pandemic that affected the global countries has affected the academic services and performance of students adversely. Many studies have been conducted about the effectiveness of online teaching and its impact. Most studies focused on challenges and few studies on opportunities. But a comprehensive study has not been conducted in Sultanate of Oman. Hence this study on the challenges and advantages of online teaching and its impact is highly relevant. A pilot study conducted by the researchers revealed that 63% of the students prefer to attend online teaching and only 37% of the students prefer to attend physically on campus in classroom settings. At the same time 56% of the students opined that they prefer to attend online exams and only 44% of the students are willing to write the exam on campus during the pandemic period. It is also identified that 61% of the students prefer to assess them with multiple choice questions in the exams. Only 9% of the students are willing to write descriptive questions in the exams. 31% of the students are willing to assess them with both multiple choice and descriptive questions. This led the researchers to identify the challenges and advantages of online learning that affects their academic performance.

Objectives of the study

1. To identify the correlation between challenges of online teaching and academic performance.
2. To measure the impact of challenges of online teaching on the academic performance of students.
3. To determine the correlation between advantages of online teaching and academic performance.
4. To measure the impact of advantages of online teaching on the academic performance of students.

Research methodology

The study uses a descriptive research design. In this cross-sectional research the respondents were selected through judgment sampling. The respondents were informed about the objective of the study and information gathering process. They were assured about the confidentiality of the data. The information utilized for this study was gathered through an online survey. The questionnaire was prepared through Google forms, and then it was circulated through the mails. Data was collected from 524 students in University of Technology and Applied Sciences, Nizwa, Sultanate of Oman. The population is 4697. Data collection was done during the period during September –October, 2021. Data were exported and analyzed using SPSS version 21.0. To measure the effect of challenges and advantages of online learning on the academic performance of students, 5-Point Likert Scale was used.

Results and Discussion

Among the sample respondents, 61% are females and 39% are males. The respondents represented 44% from Business department, 23% from Information Technology department, 29% from Engineering department and 4% from English Language Center. 36% of the students equally participated from Diploma First year and Diploma second year, 16% from Advanced Diploma, 8% from B.Tech and 4% from Foundation.

Challenges of online learning and its impact on academic performance

In order to find the correlation and the impact of challenges of online learning, the mean values of the statements are taken into analysis.

Table 1 Descriptive Statistics

	Mean	Std. Deviation	N
CGPA (Sem2)	2.8155	.59908	524
Poor internet connection (X1)	3.5000	1.39035	524
Low Speed of internet and high cost (X2)	3.6565	1.43313	524

Don't have quality learning devices (X3)	2.8359	1.48278	524
Cannot listen for long time online (X4)	3.3779	1.47974	524
Lecturer's explanations are limited to the contents of PowerPoint slides (X5)	3.2595	1.36656	524
Less interaction between students in the same class (X6)	3.5344	1.36494	524
Very boring and difficult to concentrate (X7)	3.5477	1.47367	524
Lack of consultation with Lecturers (X8)	3.3435	1.28543	524
Feel tired and sleepy while attending (X9)	3.5420	1.55343	524
More information and workload (X10)	3.6164	1.35617	524
Spend more time online than attending classes (X11)	3.5878	1.37233	524
More stress in online learning (X12)	3.6279	1.47018	524
Excess online tasks and activities (X13)	3.6508	1.26513	524
Lack of interaction with Lecturers to clarify doubts (X14)	3.4027	1.29275	524
Lack of self-discipline (X15)	3.2519	1.33832	524
Difficulty in attending practical and lab sessions (X16)	3.5534	1.41658	524
Engage in social media, eat food during online classes (multitasking) (X17)	3.3359	1.39987	524
Less outcomes are covered in online teaching (X18)	3.2920	1.38576	524
Less time to solve online test (X19)	3.7538	1.41640	524

Table 1 shows the descriptive analysis of the challenges of online learning. The mean value of dependent variable CGPA (Cumulative Grade Point Average) which is used to evaluate the academic performance of the students is 2.81 with a standard deviation of 0.59. The mean value of variable relating to time availability to solve the online assessment test is 3.75, is the highest with a standard deviation of 1.41. The variable, lack of availability of quality learning devices has lowest mean value of 2.83 and its standard deviation is 1.48.

Correlation Analysis

The correlation analysis helped to determine the relationship between the independent variable categories (X1- X19) relating to the construct- challenges of online learning and the dependent variable (CGPA showing the students' academic performance). The Pearson's correlation coefficient is used to show the direction, strength and significant of the relationship. The p-value is based on a 95% confidence interval, meaning that if the p-value is lower than 0.05 ($p<0.05$), it is regarded as statistically significant, *vice versa* (Cohen, Cohen, West & Aiken, 2013).

Table 2 Correlations

Pearson Correlation		CGPAsem2	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19
	CGPA	1.000	.008	-.007	-.070	-.053	.147	.040	-.027	-.021	-.043	.063	.018	-.051	.041	-.047	-.067	.004	.015	-.081	-.033
	X1	.008	1.000	.748	.465	.543	-.044	.508	.473	.507	.459	.441	.442	.527	.453	.493	.454	.450	.395	.455	.383
	X2	-.007	.748	1.000	.440	.610	-.086	.548	.536	.546	.524	.495	.456	.575	.457	.551	.498	.520	.406	.472	.416
	X3	-.070	.465	.440	1.000	.522	-.068	.412	.466	.424	.448	.357	.314	.421	.363	.458	.427	.385	.339	.424	.364
	X4	-.053	.543	.610	.522	1.000	-.184	.612	.703	.607	.708	.539	.510	.660	.499	.646	.616	.608	.552	.540	.503
	X5	.147	-.044	-.086	-.068	-.184	1.000	.003	-.181	-.089	-.171	.028	-.065	-.162	.020	-.160	-.124	-.135	-.064	-.130	-.048
	X6	.040	.508	.548	.412	.612	.003	1.000	.610	.619	.587	.545	.481	.559	.461	.594	.530	.535	.489	.452	.476
	X7	-.027	.473	.536	.466	.703	-.181	.610	1.000	.677	.796	.530	.558	.685	.508	.674	.632	.679	.570	.565	.525

	X8	-.021	.507	.546	.424	.607	-.089	.619	.677	1.000	.608	.521	.500	.563	.509	.713	.608	.580	.495	.519	.463
	X9	-.043	.459	.524	.448	.708	-.171	.587	.796	.608	1.000	.578	.578	.693	.513	.667	.629	.674	.624	.569	.480
	X 10	.063	.441	.495	.357	.539	.028	.545	.530	.521	.578	1.000	.592	.633	.653	.563	.483	.572	.459	.444	.446
	X 11	.018	.442	.456	.314	.510	-.065	.481	.558	.500	.578	.592	1.000	.610	.523	.528	.475	.578	.478	.474	.467
	X 12	-.051	.527	.575	.421	.660	-.162	.559	.685	.563	.693	.633	.610	1.000	.590	.651	.528	.639	.524	.573	.514
	X 13	.041	.453	.457	.363	.499	.020	.461	.508	.509	.513	.653	.523	.590	1.000	.571	.442	.525	.449	.437	.469
	X 14	-.047	.493	.551	.458	.646	-.160	.594	.674	.713	.667	.563	.528	.651	.571	1.000	.712	.707	.570	.570	.500
	X 15	-.067	.454	.498	.427	.616	-.124	.530	.632	.608	.629	.483	.475	.528	.442	.712	1.000	.566	.580	.497	.464
	X 16	.004	.450	.520	.385	.608	-.135	.535	.679	.580	.674	.572	.578	.639	.525	.707	.566	1.000	.574	.548	.530
	X 17	.015	.395	.406	.339	.552	-.064	.489	.570	.495	.624	.459	.478	.524	.449	.570	.580	.574	1.000	.537	.363
	X 18	-.081	.455	.472	.424	.540	-.130	.452	.565	.519	.569	.444	.474	.573	.437	.570	.497	.548	.537	1.000	.499
	X 19	-.033	.383	.416	.364	.503	-.048	.476	.525	.463	.480	.446	.467	.514	.469	.500	.464	.530	.363	.499	1.000

Hypothesis testing:

H0: There is no significant relationship between challenges faced in online learning and academic performance (CGPA)

H1: There is significant relationship between challenges faced in online learning and academic performance (CGPA)

Based on the results in Table 2 above, there is a weak positive relationship between challenge construct variables such as poor internet connectivity (r =0.008), inadequate explanations by tutor (r=0.147), less student interaction in class (r=0.040), excess information and work overload(r=0.063), more time spent online for activities other than classes (r= 0.018), excess online tasks and activities (r=0.041), lack of effective practical and lab sessions (r=0.004) and multitasking during online classes (r=0.015) and the dependent variable - academic performance of students (CGPA). There is a highly weak (positive) linear relationship between these independent variables and the students' academic performance (CGPA). A weak positive correlation would indicate that while both variables tend to go up or go down in response to one another, the relationship is not very strong or in other words these variables are hardly related to the students' academic performance.

From Table 2 it is clear that there is a weak negative correlation between the challenge construct variables such as low speed and high cost of internet services (X2) r = -0.007, lack of quality learning devices (X3) r = -0.070, lack of attention for online classes (X4) r = -0.053, boredom and lack of focus (X7) r = -0.027, lack of consultation with Lecturers (X8) r = -0.021, feeling tired and sleepy while in class (X9) r = -0.043, more stress attending online teaching (X12) r = -0.051, lack of student lecturer interaction to clarify doubts (X14) r = -.047, lack of self-discipline (X15) r = -0.067, less outcome coverage in online teaching (X18) r = -0.081 and inadequate time for online test (X19) r = -0.033. A weak negative correlation here indicates that when the challenge construct variables increases, the academic performance of students tends to decrease and vice versa, but in a weak or unreliable manner. To test whether the independent variables have a significant impact on dependent variable (students' academic performance i.e. CGPA), regression analysis is done.

Regression analysis

Regression analysis was performed to determine whether the independent variables (X1-X19) predict the dependent variable (CGPA). In addition, multiple linear regression analysis was used to determine which amongst the nineteen construct independent variables contribute most to the variation of the dependent variable (CGPA).

Table 3 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.244[a]	.060	.024	.59176	1.883

a. Predictors: (Constant), Less time to solve online test, Lecturers explain well with power point slides, Engage in social media eat food during online classes, Don't have quality learning devices, Poor internet connection, More information and workload, Lack of consultation with Lecturers, Spend more time online than attending classes, Less outcomes are covered in online teaching, Excess online tasks and activities, Less interaction between students in the same class, Lack of self-discipline, Difficulty in attending practical and lab sessions, Cannot listen for long time online, More stress in online learning, Low Speed of internet and high cost, Feel tired and sleepy while attending, Lack of interaction with Lecturers to clarify doubts, Very boring and difficult to concentrate

b. Dependent Variable: CGPAsem2

Table No 3 shows that the overall correlation of independent variables on the students' performance (CGPA) is 0.244. The model summary illustrates the R square value (0.060), which helps in explaining variance in the dependent variable (CGPA). The R square value represents the coefficient of determination which is the proportion of variance in the dependent variable that can be explained by the independent variables. This means that the independent variables related to the challenges of online learning, explain 6% of the variability of the dependent variable, (student performance) thus, leaving out 94% unexplained. This means that there are other independent variables that were not put into consideration in this study that is significant in explaining variation in student performance measured by CGPA.

In regression analysis, the difference between the observed value of the dependent variable (y- CGPA) and the predicted value of dependent variable (y- CGPA) is called the residual. The Durbin Watson (DW) statistic is a test for autocorrelation in the residuals from a statistical model or regression analysis. As values from 0 to less than 2 point to positive autocorrelation, DW value of 1.883 point to positive autocorrelation in the residuals.

Adjusted R^2 shows the model accuracy measure for linear models. It identifies the percentage of variance explained by only the independent variables that actually affect the dependent variable. A value that is less than or equal to 0 indicates a model that has no predictive value. Here, the model has predictive value and a value of 0.024 indicates that only 2.4% of the variance in CGPA is explained by the independent variables that actually have effect on CGPA.

Table 4 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	11.212	19	.590	1.685	.035[b]
	Residual	176.494	504	.350		
	Total	187.706	523			

a. Dependent Variable: CGPAsem2

b. Predictors: (Constant), Less time to solve online test, Lecturers explain well with power point slides, Engage in social media eat food during online classes, Don't have quality learning devices, Poor internet connection, More information and workload, Lack of consultation with Lecturers, Spend more time online than attending classes, Less outcomes are covered in online teaching, Excess online tasks and activities, Less interaction between students in the same class, Lack of self-discipline, Difficulty in attending practical and lab sessions, Cannot listen for long time online, More stress in online learning, Low Speed of internet and high cost, Feel tired and sleepy while attending, Lack of interaction with Lecturers to clarify doubts, Very boring and difficult to concentrate

The F-ratio in the ANOVA table no: 4 tests whether the overall regression model is a good fit for the data. The table shows that the independent variables statistically significantly predict the dependent variable, F = 1.685, p = 0.035 where the p < .05. (i.e., the regression model is a good fit of the data). This means that the independent/construct variables relating to the challenges in online learning are significant in explaining the variation in the dependent variable (CGPA). The ANOVA table, proves that the overall correlation 0.244 is significant. Hence the model is significant.

Table 5 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.616	.118		22.131	.000
	Poor internet connection	.021	.030	.049	.708	.479
	Low Speed of internet and high cost	.003	.030	.007	.100	.920
	Don't have quality learning devices	-.026	.022	-.065	-1.210	.227
	Cannot listen for long time online	-.016	.030	-.040	-.542	.588
	Lecturer's explanations are limited to the contents of PowerPoint slides	.044	.020	.101	2.189	**.029**
	Less interaction between students in the same class	.038	.028	.086	1.344	.180
	Very boring and difficult to concentrate	.030	.034	.074	.877	.381
	Lack of consultation with Lecturers	-.008	.033	-.018	-.254	.800
	Feel tired and sleepy while attending	-.024	.032	-.062	-.741	.459
	More information and workload	.048	.030	.108	1.605	.109
	Spend more time online than attending classes	.012	.027	.028	.456	.648
	More stress in online learning	-.045	.030	-.110	-1.469	.142
	Excess online tasks and activities	.023	.030	.048	.764	.445
	Lack of interaction with Lecturers to clarify doubts	-.017	.038	-.036	-.434	.664
	Lack of self-discipline	-.043	.031	-.097	-1.416	.157
	Difficulty in attending practical and lab sessions	.028	.030	.065	.907	.365
	Engage in social media, eat food during online classes	.035	.026	.081	1.305	.193
	Less outcomes are covered in online teaching	-.042	.026	-.097	-1.601	.110
	Less time to solve online test	-.012	.024	-.028	-.487	.626

a. Dependent Variable: CGPA Sem2

Estimated model coefficients

The general form of the equation to predict CGPA (Student performance) from the construct/independent variables is:

Predicted CGPA = 2.616 + (0.021 x poor internet connection) +(0.003 x low speed and high cost of internet)- (0.026 x lack of quality learning devices) - (0.016 x inability to listen to long online classes) + (0.044 x effectiveness of lecturer explanations) + (0. .038 x less interaction with students in the class) + (0. .030 x boring and difficult to concentrate) – (0.008 x lack of consultation with Lecturers) – (0. 024 x feeling tired and sleepy while attending online class) + (0. .048 x more information and workload) + (0. 012 x spend more time online other than attending classes) - (0. 045 x more stress) + (0. 023 x excess online tasks and activities) – (0. 017 x lack of interaction with Lecturers for doubt clarification) – (0. 043 x lack of self-discipline) + (0. 028 x difficulty in attending practical/lab sessions) + (0. 035 x engage in multitasking during online classes) – (0. 042 x less outcomes covered in online teaching) – (0. 012 x less time availability during online test)

The Unstandardized coefficients in the table 5 above indicate how much the dependent variable (CGPA) varies with an independent variable when all other independent variables are held constant. The unstandardized coefficient, B, for lack of quality learning devices is equal to -0.026. This means for each one unit/percent increase in the lack of availability of quality learning devices, the student performance (CGPA) measure decreases by 0.026 percent. Similarly, the other challenges like inability to listen to long online classes, lack of consultation with Lecturers, feeling tired and sleepy while attending online classes, stress, lack of interaction with Lecturers for doubt clarifications, lack of self-discipline, less outcomes covered in online teaching, less time availability during online test brings down the students' performance (CGPA). The decrease is measured by 0.016, 0.008, 0.024, 0.045, 0.017, 0.043, 0.042, 0.012 units respectively.

Table coefficients table 5 depicts the statistical significance of each of the independent variables. The table helped to compare which of the nineteen predictor variables contribute the most to the variation of student performance. Therefore, to make the comparison, the Beta standardized coefficients were used. The results indicate that the effectiveness of lecturer explanations during online classes is the only predictor variable that contributes to the variation of student performance (β= 0.101*;* p= 0.029). The other construct variables/independent variables are not significant predictors of student performance Thus it is statistically proved that the effectiveness of lecturer's explanations in online classes has a significant impact on the student performance (CGPA). For the other eighteen remaining independent variables the significance values are greater than 0.05. This shows that the other independent variables have insignificant impact on student performance.

Hence, the analysis result shows that for Hypothesis No.1, the alternate hypothesis (H1) is accepted proving that even though there is weak positive correlation, there is significant relationship between the effectiveness of lecturer explanations in online classes on the student performance.

Therefore, the Regression equation is developed as follows:

Y= a + b X

Where 'Y' is the dependent variable Student performance (CGPA), a and b are constants.

The model equation based on the analysis is given below:

Y = 2.616 + 0.044(X5), (where X5 represents adequate lecturer explanations in online classes)

Advantages of Online learning and its impact on academic performance

Table 6 Descriptive Statistics

	Mean	Std. Deviation	N
CGPA Sem2	2.8155	.59908	524
More convenient and flexible	2.7958	1.51673	524
Get more time to learn	3.1393	1.42823	524
Saves time and cost	3.3511	1.43261	524

Can access and review the video classes anytime	3.6851	1.39038	524
Smooth interaction is possible due to chat, camera and microphone	3.1641	1.36459	524
Can learn at own speed and convenience	3.0344	1.35439	524
Being recorded Lecturers take well-structured classes	3.2176	1.30245	524
More free to ask questions to the Lecturers	3.0420	1.44436	524
Can access and attend online classes from anywhere	3.2958	1.42308	524
Can focus and learn online classes better than classroom classes	2.6603	1.50050	524

Table 6 shows the descriptive analysis of the advantages of online learning. The mean value of dependent variable CGPA (Cumulative Grade Point Average) which is used to evaluate the academic performance of the students is 2.81 with a standard deviation of 0.59. The mean value of variable relating accessibility and review of video classes anytime is 3.68, is the highest with a standard deviation of 1.39. The variable, better focus and learning for online classes than classroom classes has lowest mean value of 2.66 and its standard deviation is 1.50.

Correlation Analysis

The correlation analysis helped to determine the relationship between the independent variable categories (x1- x10) relating to the advantages of online learning and the dependent variable (CGPA showing the students' academic performance).

Table 7 Correlations

		CGPA Sem2	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Pearson Correlation	CGPA Sem2	1.000	.042	.098	.168	.173	.084	.102	.151	.096	.107	.069
	More convenient and flexible	.042	1.000	.581	.551	.426	.656	.664	.586	.626	.583	.690
	Get more time to learn	.098	.581	1.000	.547	.474	.526	.569	.491	.509	.431	.510
	Saves time and cost	.168	.551	.547	1.000	.635	.590	.645	.603	.622	.600	.591
	Can access and review the video classes anytime	.173	.426	.474	.635	1.000	.530	.621	.629	.556	.550	.483
	Smooth interaction is possible due to chat, camera and microphone	.084	.656	.526	.590	.530	1.000	.707	.668	.632	.573	.655
	Can learn at own speed and convenience	.102	.664	.569	.645	.621	.707	1.000	.710	.714	.610	.704
	Meet being recorded, Lecturers take well-structured classes	.151	.586	.491	.603	.629	.668	.710	1.000	.687	.623	.596
	More free to ask questions to the Lecturers	.096	.626	.509	.622	.556	.632	.714	.687	1.000	.613	.712
	Can access and attend online classes from anywhere	.107	.583	.431	.600	.550	.573	.610	.623	.613	1.000	.618
	Can focus and learn online classes better than classroom classes	.069	.690	.510	.591	.483	.655	.704	.596	.712	.618	1.000

Hypothesis testing

H0: There is no significant relationship between advantages of online learning and academic performance (CGPA)

H2: There is significant relationship between advantages of online learning and academic performance (CGPA)

Based on the results in Table 7 above, there is a weak positive relationship between advantage construct variables such as convenience and flexibility of online classes (r=0.042), more time to learn (r=0.098), saves time and cost (r=0.168), accessibility and review of video classes anytime (r=0.173), smooth

interaction using online devices and facilities (r=0.084), learning at one's own pace and convenience (r=0.102), well-structured classes (r=0.151), freedom to ask questions to Lecturers (r=0.096), anywhere access (r=0.107) better focus and learning than classroom classes (r=0.069) and the dependent variable - academic performance of students (CGPA). There is a highly weak (positive) linear relationship between these independent variables and the students' academic performance (CGPA). A weak positive correlation would indicate that while both variables tend to go up in response to one another, the relationship is not very strong or in other words these variables are hardly related to the students' academic performance.

To test whether the independent variables having weak positive correlation do have a significant impact on dependent variable (students' academic performance i.e. CGPA), regression analysis is done.

Table 8 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.216[a]	.047	.028	.59055	1.882

a. Predictors: (Constant), Can focus and learn online classes better than class room classes, Can access and review the video classes anytime, Get more time to learn, Can access and attend online classes from anywhere, Smooth interaction is possible due to chat camera and microphone, Saves time and cost, Being recorded Lecturers take well-structured classes, More convenient and flexible, More free to ask questions to the Lecturers, Can learn at own speed and convenience

b. Dependent Variable: CGPAsem2

Table No 8 shows that the overall correlation of independent variables on the students' performance (CGPA) is 0.216. The R square value (0.047) represents the coefficient of determination which is the proportion of variance in the dependent variable that can be explained by the independent variables. This means that the independent variables (advantages of online learning) explain 4.7% of the variability of the dependent variable, (student performance) thus, leaving out 95.3% unexplained. This means that there are other extra independent variables that were not put into consideration in this study that is significant in explaining variation in student performance measured by CGPA.

The Durbin- Watson value of 1.882 point to positive autocorrelation in the residuals. Adjusted R^2 shows the model accuracy measure for linear models. It identifies the percentage of variance explained by only the independent variables that actually affect the dependent variable. A value that is less than or equal to 0 indicates a model that has no predictive value. Here, the model has predictive value and a value of 0.028 indicates that only 2.8% of the variance in CGPA is explained by the independent variables that actually have effect on CGPA.

Table 9 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.798	10	.880	2.523	.006[b]
	Residual	178.908	513	.349		
	Total	187.706	523			

a. Dependent Variable: CGPAsem2

b. Predictors: (Constant), Can focus and learn online classes better than class room classes, Can access and review the video classes anytime, Get more time to learn, Can access and attend online classes from anywhere, Smooth interaction is possible due to chat camera and microphone, Saves time and cost, Being recorded Lecturers take well-structured classes, More convenient and flexible, More free to ask questions to the Lecturers, Can learn at own speed and convenience

The F-ratio in the ANOVA table no: 9 tests whether the overall regression model is a good fit for the data. The table shows that the independent variables statistically significantly predict the dependent variable, $F = 2.523$, $p = 0.006$ where the $p < .05$. (i.e., the regression model is a good fit of the data). This means that

the independent variables relating to the advantages in online learning are significant in explaining the variation in the dependent variable (CGPA). The ANOVA table, proves that the overall correlation 0.216 is significant. Hence the model is significant.

Table 10 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.494	.083		29.928	.000
	More convenient and flexible	-.035	.027	-.088	-1.268	.205
	Get more time to learn	.012	.024	.030	.513	.608
	Saves time and cost	.056	.028	.133	1.995	**.047**
	Can access and review the video classes anytime	.042	.027	.097	1.524	.128
	Smooth interaction is possible due to chat, camera and microphone	-.014	.031	-.032	-.455	.649
	Can learn at own speed and convenience	-.015	.035	-.035	-.438	.661
	Being recorded Lecturers take well-structured classes	.055	.033	.120	1.666	.096
	More free to ask questions to the Lecturers	-.011	.030	-.027	-.371	.711
	Can access and attend online classes from anywhere	.003	.027	.008	.126	.900
	Can focus and learn online classes better than classroom classes	-.009	.029	-.023	-.311	.756

a. Dependent Variable: CGPAsem2

Estimated model coefficients

The general form of the equation to predict CGPA (Student performance) from the construct/independent variables is:

Predicted CGPA = 2.494 - (0.035 x convenience and flexibility of online classes) +(0.012 x more time to learn) + (0.056 x saves time and cost) + (0.042 x accessibility and review of video classes anytime) - (0.014 x smooth interaction using online devices and facilities) - (0. .015 x learning at one's own pace and convenience) + (0.055 x well-structured classes) – (0.011 x freedom to ask questions to Lecturers) + (0. 003 x anywhere access) - (0. .009 x better focus and learning than classroom classes)

The Unstandardized coefficients in the table 10 above indicate how much the dependent variable (CGPA) varies with an independent variable when all other independent variables are held constant. The unstandardized coefficient, (B) for getting more time to learn is equal to 0.012. This means that for each one unit/percent increase in the availability of more time to learn, the student performance (CGPA) increases by 0.012 percent. Similarly, the other advantages like saving of time and cost, accessibility and review of video classes anytime, well-structured classes, anywhere access of online classes improves the student performance (CGPA). The increase is measured by 0.056, 0.042, 0.055 and 0.003 respectively.

The analysis reveal that the other advantages/privileges like smooth interaction using online devices and facilities, learning at one's own pace and convenience, having more freedom to ask questions to Lecturers while attending online classes and the feel of having better focus and learning than classroom classes predict to bring down the students' performance (CGPA). The decrease is measured by 0.035, 0.014, 0.015, 0. 011, 0. 009 units respectively.

The coefficients from table 10 depicts the statistical significance of each of the independent variables. The table helped the researchers to compare which of these ten predictor variables contribute the most to the variation of student performance. Therefore, to make the comparison, the Beta standardized coefficients

were used. The results indicate that the benefit of savings in time and cost due to online classes is the only predictor variable that contributes to the variation of student performance (β= 0.133*; p*= 0.047). The other construct variables/independent variables are not significant predictors of student performance Thus it is statistically proved that the benefit of saving the time and cost due to online classes has a significant impact on the student performance (CGPA). For the other nine remaining independent variables the significance values are greater than 0.05. This shows that the other independent variables (relating to the construct- advantages of online learning) have insignificant impact on student performance.
Hence, the analysis result shows that for Hypothesis No.2, the alternate hypothesis (H1) is accepted proving that even though there is weak positive correlation, there is significant relationship between the time and cost effectiveness due to online classes on the student performance.
Therefore, the Regression equation is developed as follows:
Y= a + b X
Where 'Y' is the dependent variable Student performance (CGPA), a and b are constants.
The model equation based on the analysis is given below:
Y = 2.494 + 0.056 (x3), (where x3 represents the benefits of time and cost effectiveness to students due to online classes)

Findings of the study

1. Among the challenge variables, variables X1, X5, X6, X10, X11, X13, X16 and X17 have weak positive relationship with the student performance (CGPA) and variables X2, X3, X4, X7, X8, X9, X12, X14, X15, X18 and X19 have weak negative relationship with student performance (CGPA). These variables hardly effect the student performance. The only variable that is proved to have significant impact on student performance is X5 i.e. inadequate lecturer explanations to topic during the online class. Therefore, the model equation is derived as follows:
   Y = 2.616 + 0.044(X5), (where X5 represents adequate lecturer explanations in online classes)

2. The advantage construct variables have weak positive relationship with the student performance. Except for variable x3 i.e. benefits of time and cost effectiveness of online classes, the other advantages of online classes are proved to have insignificant impact the student performance. The model equation is derived as:
   Y = 2.494 + 0.056 (x3), (where x3 represents the benefits of time and cost effectiveness to students due to online classes)

3. The analysis throw light to the findings that certain challenges of online learning such as lack of availability of quality learning devices, inability to listen to long duration online classes, lack of consultation with Lecturers, feeling of boredom and tiredness, stress, lack of interaction with Lecturers for doubt clarification, lack of self-discipline, less outcomes covered in online classes and inadequate time for online assessments predicts decrease in the student performance.

4. The model predicts that certain advantages/privileges of online classes such as smooth interaction and access using online devices and facilities, learning at one's own pace and convenience, having more freedom to ask questions to Lecturers while attending online and a feel of having better focus and learning than classroom teaching causes the student performance to vary at a decreasing rate.

Conclusion

It can be concluded from the study that among the challenges and advantages of online learning, inadequacy of lecturer explanations to topics during online classes and the benefits of time and cost effectiveness to students while attending the classes online are the variables that have significant impact on the student performance. The challenge construct variables (independent variables X1-X19) predict the

dependent variable (Student performance measured by CGPA) only by 6% leaving out 94% unexplained. Similarly, the advantage construct variables (independent variables x1-x10) predict the student performance by only 4.7% leaving out 95.3 % unexplained. In a nutshell, this means that there are other extraneous variables that were not put into consideration in this study that is significant in explaining variation in student performance.

Recommendations

1. The tutors/advisors can focus on the challenges faced by the students that adversely affects their learning and academic performance. Also, not to rule out the privileges that are available to the students that may bring down their academic performance. Certain advantages like taking screenshots or photos of solutions to practice problems discussed in online classes without actually solving them during class hours, multitasking and engaging in other activities while attending online classes, developing the habit of procrastination of learning and practice sessions with the thought of accessing the online class recording later on makes the students less active compared to classroom learning.
2. In online teaching, there is the problem of minimal physical interaction between students and Lecturers. Many students skip tasks and classroom sessions, an action that has implications for online education. This can be overcome with the use of suitable teaching methodologies that focus on Student Centered learning activities. This improves students' ability to interact with Lecturers and ask questions for immediate help.
3. The study also suggests to conduct future studies on other independent variables that were not put into consideration in this study that is significant in explaining variation in student performance. Predicting the student performance based on gender, revision time, test anxiety, online lecture attendance and involvement in discussions and practice session can be focused on in future longitudinal studies.

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