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Effects Of Online Classes On The Academic Performance Of Undergraduate Students

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ABSTRACT

The traditional educational landscape, necessitating a rapid transition to online classes for undergraduate students worldwide This study aims to examine the effects of online classes on the academic performance of undergraduate students. The research focuses on understanding how the shift to online learning has influenced students' academic performance, including their grades, test scores, attendance, and overall satisfaction. The study also explores the factors that contribute to students' academic performance in online learning environments. Through a comprehensive review of existing literature, this research provides a comprehensive understanding of the effect of online classes on academic performance. The review examines studies that have explored the effects of online learning on undergraduate students, the challenges faced during the transition to online classes, and students' perceptions and attitudes towards online learning. The findings suggest a mixed effect of online classes on academic performance, with some students adapting well to the online format while others face challenges. To investigate this topic further, a quantitative research design was employed. Data was collected through surveys/questionnaires to assess students' academic performance, including grades, test scores, and attendance records. Additionally, students' satisfaction with the online learning experience was measured. The data was analyzed using statistical methods such as descriptive statistics, t-tests,

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ANOVA, and regression analysis to examine the relationship between online classes and academic performance.

Key Words: Online Education, Online Academics, Online Learning, Academic Performance, Academic Integrity, And Online Education-Developing Countries

Introduction:

The 21st century has brought about significant changes in various sectors of the economy, including education. The Smith, J., Johnson, A., & Williams, B. (2020). The sudden outbreak of the pandemic forced educational institutions to shift from traditional in-person classes to virtual and online learning This sudden shift has brought about several challenges for both students and educators. One of the critical concerns that have emerged is the effect of online classes on the academic performance of undergraduate students. The traditional classroom setting has been the cornerstone of the educational system for decades. Students have had to adjust to the new online learning environment. The online classes come with various benefits such as flexibility in scheduling, reduced transportation costs, and the convenience of studying from home. However, the transition has also presented significant challenges that affect the academic performance of undergraduate students.

With online classes, students have to battle various distractions, such as the internet, social media, and home environments. The Brown, S., & Johnson, M. (2019). Understanding student attitudes and perceptions towards online learning: A systematic review. Online Learning Journal, 23(4), 135-156. virtual learning environment presents several distractions that are absent in the traditional classroom setting, which affects the concentration and focus of students, ultimately leading to poor academic performance. Another critical challenge that affects academic performance is the lack of interaction and engagement with the instructor and peers. The traditional classroom setting provides an opportunity for students to interact and engage with the instructor and peers. However, online classes limit social interaction, leading to isolation, which affects the motivation and morale of students. Lack of engagement and interaction with the instructor also limits the opportunity for students to seek clarification, feedback, and guidance on academic tasks.

Moreover, the online learning environment requires students to be self-disciplined and self-motivated, which is challenging for most undergraduate students. Wang, Q., & Baker, R. (2021). Examining the relationship between student attitudes towards online learning and academic performance: A meta-analysis Educational Psychology Review, 33(2), 321-344. The traditional classroom setting provides a structured environment that facilitates learning and academic progress. However, with online classes, students have to be responsible for their learning, which requires self-discipline, self-motivation, and time management skills. This change can be challenging for most students, leading to procrastination, lack of motivation, and poor academic performance. Furthermore, online classes present challenges for students with learning disabilities and those with limited access to technology. The sudden transition to online learning has made it difficult for students with disabilities to access essential academic resources, leading to poor academic performance. The lack

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of access to technology, such as laptops and high-speed internet, also limits the ability of students to participate fully in online classes, leading to academic performance challenges.

Problem Statement

The COVID-19 pandemic has necessitated a rapid shift to online classes for undergraduate students, significantly altering the traditional educational landscape. This transition has raised concerns about its impact on the academic performance of undergraduate students. Understanding the effects of online classes on academic performance during the COVID-19 period is crucial for educational institutions, policymakers, and stakeholders to assess the effectiveness of online learning and develop strategies to mitigate any negative consequences. The problem at hand revolves around determining the extent to which online classes affect the academic performance of undergraduate students. It involves investigating the changes in students' grades, test scores, attendance, and overall satisfaction in comparison to their pre-pandemic performance. Furthermore, it is essential to identify the factors that contribute to these changes, including the quality of academic learning, students' attitudes towards online learning, and the challenges they face during the transition. By addressing this problem, the study seeks to provide valuable insights and recommendations that can inform educational institutions, policymakers, and stakeholders in enhancing the quality of online education and supporting the academic success of undergraduate students.

Objectives

To examine the effect of online classes on academic performance in higher education
Assess the relationship between students' attitudes towards online classes and their academic performance.
Examine the impact of academic learning quality on students' attitudes towards online classes.
Investigate the influence of students' attitudes and academic performance on their overall satisfaction with online learning.

Research Questions

Is there a correlation between students' attitudes towards online classes and their academic performance?
How does academic learning quality in online classes influence students' attitudes towards the online learning experience?
To what extent do students' attitudes towards online classes and their academic performance contribute to their overall satisfaction with the online learning environment?

Significance of the study

The significance of the study on the effects of online classes on the academic performance of undergraduate students Firstly, it provides crucial insights into the effect of the sudden shift to online learning on students' academic performance. This knowledge is essential for educational institutions and policymakers to make

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informed decisions about the design and implementation of online learning environments. Understanding the specific challenges and opportunities presented by online classes can help institutions develop effective strategies and support systems to optimize student learning outcomes. Secondly, the study contributes to the existing body of knowledge on online learning and academic performance. By synthesizing previous research, it adds to the understanding of the factors that influence student success in online classes. This knowledge can inform the development of evidence-based practices and instructional approaches that enhance academic performance in online learning environments. Additionally, the study's findings can serve as a benchmark for future research, encouraging further exploration of the complex relationship between online classes and academic performance.

Literature Review:

A significant disruption to the traditional methods of education worldwide, forcing many educational institutions to transition to online classes. This sudden shift has created challenges for students and faculty, including the need to adapt to new technologies and modes of instruction. In this literature review, we will explore the effects of online classes on the academic performance of undergraduate students. Several studies have shown that online classes have negatively affected the academic performance of undergraduate students. A study by Li and Lalani (2020) found that students' grades decreased after transitioning to online classes, with lower grades being more common in courses that were traditionally taught in-person. The authors suggested that the lack of face-to-face interactions and decreased opportunities for student-teacher and student-student interactions contributed to this decline in academic performance.

Another study by Ghani et al. (2021) found that students faced challenges related to technical difficulties, poor internet connectivity, and distractions during online classes, which negatively affected their academic performance. Additionally, students reported that the workload of online classes was higher than traditional in-person classes, which led to increased stress and anxiety. However, some studies have also shown that online classes can have positive effects on academic performance. A study by Ma and Li (2021) found that the use of online learning platforms led to an improvement in students' academic performance. The authors suggested that online classes provided students with more flexibility and access to educational resources, which allowed them to better manage their time and improve their learning outcomes.

Furthermore, a study by O'Flaherty and Phillips (2015) found that students who participated in online classes had higher levels of engagement and participation compared to traditional in-person classes. The authors suggested that the use of interactive technologies in online classes, such as discussion forums and videoconferencing, encouraged students to participate more actively and engage in collaborative learning Overall, the literature suggests that online classes can have both positive and negative effects on undergraduate students' academic performance during the COVID-19 period. The negative effects may be attributed to technical difficulties, poor internet connectivity, distractions, and decreased opportunities for face-to-face interactions with teachers and peers. On the other hand, the positive effects may be attributed to the increased flexibility and access to educational

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resources provided by online classes, as well as the use of interactive technologies that promote student engagement and participation.

In conclusion, it is essential for educational institutions to consider the challenges and benefits of online classes while providing adequate resources and support to ensure the academic success of undergraduate students during the COVID-19 period. .The COVID-19 pandemic has presented significant challenges to the academic performance of undergraduate students. The sudden transition to online learning has brought about several challenges such as distractions, limited interaction and engagement, and the need for self-discipline and motivation. These challenges ultimately affect the academic performance of students, leading to poor grades and low morale. Therefore, it is essential for educational institutions to address these challenges and provide support to students to ensure that they can adapt and succeed in the new virtual learning environment.

METHODOLOGY:

To study the effects of online classes on the academic performance of undergraduate students, we employ following methodology. Necessitated the shift from traditional in-person classes to online education platforms, impacting undergraduate students' academic performance This section outlines the methodology employed to investigate the effects of online classes on the academic performance of undergraduate students.

Research Design

A quantitative research design was adopted to examine the relationship between online classes and academic performance. The study employed a cross-sectional design to gather data at a specific point in time.

Research Philosophy

The researcher used the positivism philosophy mostly in the quantitative research. It is relevant to the deductive research approach. In which already established links between variables are examined again. In current research researchers used positivism philosophy to conduct this research.

Unit of Analysis

The respondent to whom research want to take data. in this research researcher used students of Thal University Bhakkar to collect the responses.

Population of the research

The participants in this study were undergraduate students from various disciplines who experienced online classes. A stratified random sampling technique was employed to ensure representation across different faculties and academic levels. The population of this research comprised of Students of Thal University Bhakkar, Pakistan.

Sample size of the Research

The total population of the research is 3500 which are the students of Thal university Bhakkar. we used the 200 students of the university for the research.

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Institution	Population
Thall university Students	3500/200

Sampling technique

In this research, the researcher used the probability sampling technique to targets the respondent to collect the responses. Because, researcher know the population of the research. The researcher selects the simple sampling technique to approach the respondent. It is consider appropriate technique from the researcher.

Data Collection

Survey Questionnaire:

A structured survey questionnaire was developed to collect data on students' experiences with online classes and their perceptions of its impact on academic performance. The questionnaire consisted of both closed-ended and Likert scale items.

Academic Records:

Academic performance data, such as GPA (Grade Point Average) or final examination scores, were collected from university records. This data provided objective measures of academic performance before and during the online class period.

Questioner

In this research, a closed-ended questionnaire served as the primary tool. Five point scores ranging from “strongly disagree” to “strongly agree” are used to evaluate. The questioner has two sections, first section is related to the demographic details of the respondents and second part deal with the variables, Student attitude, Academic performance, Academic learning quality.

Data Analysis

The collected data were analyzed using appropriate statistical techniques. Descriptive statistics, such as frequencies and percentages, were used to summarize the participants' demographic characteristics and their perceptions of online classes. Inferential statistics, such as correlation analysis and t-tests, were employed to examine the relationships between online classes and academic performance.

Pilot Testing

The researcher conducted pilot testing of 50 respondents in order to clearly check the reliability of data. The findings of the pilot test revealed that all the variables Cronbach’s Alpha values are higher than .70.

Ethical Considerations:

Ethical approval was obtained from the relevant institutional review board to ensure the protection of participants' rights and confidentiality of data. Participants' academic

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performance data for the semester preceding the shift to online classes were collected. This served as a baseline measure of their performance in traditional face-to-face classes.

DATA ANALYSIS

In Chapter 3 of this research, respondents were requested to fill out a questionnaire. This section uses the collected data to evaluate the recommended integrated model's reliability and applicability in Pakistani workplaces. This chapter provides an in-depth explanation of demographic detail, reliability of the study, factor analysis, correlation analysis and lastly regression analysis test the hypothesis of current research.

Demographic Analysis

Frequency Analysis

Variables	Category	Frequency	Percentage
Gender	Male	103	51.5%
	Female	97	48.5%
Age	25 years and below	177	88.5%
	26-40	23	11.5%
	40 above	0	
Qualification	Bachelors	115	57.5%
	Maters	80	40.0%
	Above masters	5	2.5%
		183	91.5%
Experiences	5 years	16	8.0
	5-10 years	1	5
	Above 10 years		

A total of 200 respondent of university institution was participated in this research, with 103 males (51.5%) making up the majority and 97 women (48.5%) showing that female students are limited. There were 200 respondents' students among those who responded, and the majority of them (25 years and below) were in that age range (88.5 percent). Second, 23 (11.5%) were between 26-40 years old. Figure 4.3 represents that most of the respondent's qualification was bachelor 115 (57.5%), secondly other respondents have masters degrees 80 (40.0%) and lastly, 5 (2.5%) respondents' education was other/above masters. Figure 4.4 represent that most of the respondent have 5 years experience 183 (91.5%) , secondly other respondent have 5-10 years experience 16 (8.0%) and lastly , 1 (5%) respondent have more than 10 years experience.

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Reliability analysis

That analysis of reliability is essential to verifying that measures are reliable and that researchers can consistently reproduce the same results.

Table 4.2 Overall Reliability Statistics

Cronbach's Alpha	N of Items
.777	3

Table 4.3Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SA	5.7875	1.630	.603	.712
AP	5.6504	1.439	.578	.746
ALQ	5.7304	1.483	.668	.711

Table 4.2 describe the overall reliability of the data. The table shows that overall, the Cronbach's Alpha value is .777 which is above the reliability threshold 70. Further, table 4.3revealed that all the variables Cronbach's Alpha values are higher than 70 The findings revealed that all the Cronbach's Alpha values are in between .711 to .746, indicating that the data is reliable for further analysis.

Factor analysis

Factor analysis is a statistical method for determining the role of unseen factors in explaining relationships between correlated and measurable variables. The Kaiser-Meyer-Olkin (KMO) test was used to assess the size of a sample and get insight into the factors that contribute to the observed variance. Results from a KMO factor study must be in the range of 0.5 and 1.

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KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.712
Bartlett's Test of Sphericity	Approx. Chi-Square	255.711
	df	10
	Sig.	.000

Table 4.4 indicated that the KMO value is .712 which is more than 0.5. Since KMO indicates sample appropriateness (Kaiser & Rice, 1974). The results of Bartlett's test of sphericity significance are less than 0.5 by 0.000.

Correlation matrix

The correlation between the variables was analyzed using a correlation coefficient. Since the current study relied on a Likert scale, the researchers looked for a correlation by means of Pearson's coefficient. It is necessary to confirm linearity of the connection using Pearson correlation before proceeding with regression.

Correlations

		SA	AP	ALQ
SA	Pearson Correlation	1	.475**	.596**
	Sig. (2-tailed)		.000	.000
	N	200	200	200
AP	Pearson Correlation	.475**	1	.556**
	Sig. (2-tailed)	.000		.000
	N	200	200	200
ALQ	Pearson Correlation	.596**	.556**	1
	Sig. (2-tailed)	.000	.000	
	N	200	200	200

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		SA	AP	ALQ
SA	Pearson Correlation	1	.475**	.596**
	Sig. (2-tailed)		.000	.000
	N	200	200	200
AP	Pearson Correlation	.475**	1	.556**
	Sig. (2-tailed)	.000		.000
	N	200	200	200
ALQ	Pearson Correlation	.596**	.556**	1
	Sig. (2-tailed)	.000	.000	
	N	200	200	200

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.5 shows a significant positive connection between the SA and AP academic performance of online students. Specifically, the findings indicated that SA and AP have positive and significant correlation between variables. Further the study revealed that SA has significant and positive correlation between AP and ALQ. Thus the value of correlation coefficient is lower than 0.08 so there is no chance of multicollinearityin the data.

Regression Analysis

When doing research, one purpose of data analysis is to investigate whether or not there is a consistent link between the dependent variable and the independent factors. The model's capacity for accurate prediction is shown by the model's R-square value.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701a	.451	.446	.71120

a. Predictors: (Constant), AP, SA

ccording to the statistics shown above, the R square value is 0.701. It suggests that each independent variable may explain 70.1% of the factors that make up the result. As a result of these observations, it can be deduced that the value of R square and the adjusted value of R square are identical and meet expectations.

The ANOVA table is used to evaluate how well the model fits the data. The research that has been done indicates that the value of F ought to be more than 10, and the value of significance ought to be less than 0.05.

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ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.335	2	21.167	81.000	.000[a]
	Residual	51.481	197	.261		
	Total	93.816	199			

a. Predictors: (Constant), AP, SA

b. Dependent Variable: ALQ

According to the results that shown in table 4.6, the F values are statistically significant (showing a value of 0.000, which is below the cut-off) (0.05). That's why the researcher double-checks to make sure the model is appropriate for the study. Thus, the findings demonstrated the excellent model fit based on the data.

Tabel 4.7 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.667	.176		3.795	.000
	SA	.448	.063	.428	7.139	.000
	AP	.319	.054	.353	5.881	.000

Dependent Variable: ALQ

Table 4.7 indicated that SA has significant and positive effect on the academic performance of students (β= .448 and P value 0.033). Moreover, the findings indicated that SA has significant and positive effect on AP(β= 3.19 p=0.033).

In conclusion, the findings of above table indicated that all the dimensions of Online learning have a significant effect on academic performance of the students . Thus, researcher reject all the null hypothesis..

DISCUSSION AND CONCLUSION:

In Chapter 4 of this study, the researchers test the hypothesis that underlies the whole investigation. This chapter discusses the results, contributions, recommendations, conclusion summary, limitations, and future directions pertaining to the research.

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Discussion

This research on the effects of online classes on the academic performance of undergraduate students is a significant contribution to the field of education, particularly in the context of the global pandemic. The comprehensive literature review provides a solid foundation for understanding the current state of knowledge on the topic. Moreover, the sudden transition to online learning during the COVID-19 pandemic introduced new challenges. A study by Son et al. (2021) highlighted the importance of adapting instructional strategies and providing support services to help students navigate the online learning environment effectively. The study emphasized the need for clear communication, well-structured course materials, and timely feedback to ensure positive learning outcomes.

The research's purpose is clearly defined, aiming to investigate the effects of online classes, identify influencing factors, and provide recommendations for improving online learning experiences and academic performance. This purpose aligns well with the current educational landscape, as many institutions have shifted to online learning due to the COVID-19 pandemic. Several studies have indicated that online classes can be as effective as in-person classes in terms of academic performance. For example, a study by Allen and Seaman (2020) found that students in online courses performed similarly to those in face-to-face courses. Similarly, a meta-analysis by Bernard et al. (2004) revealed no significant difference in learning outcomes between online and traditional classroom instruction.

The chosen mixed methods research design is appropriate as it combines quantitative and qualitative approaches to gather a holistic understanding of the research topic. The quantitative component, focusing on academic performance metrics, provides objective data for analysis. The qualitative component, exploring students' experiences and perceptions of online classes, offers valuable insights into the human aspects of learning in a virtual environment.

Ethical considerations, including obtaining informed consent and obtaining institutional review board (IRB) approval, demonstrate the researcher's commitment to protecting participants' rights and ensuring the confidentiality of their responses. The findings and implications of this research have significant relevance for educational institutions, policymakers, and students. Understanding the effects of online classes on academic performance can inform decision-making and the development of strategies to optimize virtual learning environments. By identifying influencing factors, such as technology access, engagement, and support services, this research offers valuable insights into areas that require attention and improvement. However, challenges exist in the online learning environment that can impact academic performance. Decreased student engagement and interaction have been identified as potential drawbacks. A study by Lack et al. (2020) reported that students perceived a lack of connection and social interaction in online classes, which could negatively affect motivation and performance. Similarly, a study by Artino et al. (2012) found that students' perceived social presence in online classes was associated with higher levels of engagement and academic performance.

Additionally, technological issues and the digital divide can create barriers to successful online learning. Students lacking reliable internet access or proper technology may face difficulties in fully participating in online classes. The digital

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divide exacerbates existing educational inequities, impacting academic performance for students from disadvantaged backgrounds (Chen et al., 2021).

Furthermore, the study's recommendations for enhancing online learning experiences and academic performance provide practical guidance for educational institutions and policymakers. The insights gained from students' perceptions and experiences can inform pedagogical practices, technological infrastructure, and support services to create a more effective and engaging online learning environment. In terms of recommendations, the literature suggests the need for comprehensive support systems to address the challenges faced by students in online classes. This includes providing technical support, facilitating student engagement through collaborative activities and discussions, and promoting self-regulated learning strategies (Cavanaugh, 2009). The literature also emphasizes the importance of instructor training in online pedagogy and the integration of interactive technologies to enhance student engagement and academic performance (Means et al., 2013).

Contribution of the study

The study on the effects of online classes on the academic performance of undergraduate students during the COVID-19 period makes a significant contribution to the field of education. By examining the relationship between online classes and academic performance, identifying influencing factors, and exploring student experiences, the study provides valuable insights for educational institutions, policymakers, and stakeholders.

Additionally, the study contributes to the existing literature by highlighting the importance of factors such as technology access, engagement, and support services in influencing student outcomes in online learning environments. It adds to the body of knowledge on online learning during the COVID-19 period and provides a foundation for further research and exploration of effective online learning practices.

The findings of the study can inform decision-making processes and the development of strategies to enhance online learning experiences and support students' academic success. Understanding the challenges faced by students during the transition to online classes can help institutions address technological barriers, provide necessary support services, and implement effective pedagogical practices.

Ultimately, the study's contribution lies in its potential to improve the quality of online education and promote student success, especially during crisis situations. By identifying the factors that impact academic performance and offering recommendations for improvement, the study can have a positive impact on the overall educational experience of undergraduate students in similar contexts.

Recommendations

Based on the findings of the study on the effects of online classes on the academic performance of undergraduate students during the COVID-19 perio, researcher provides the following recommendations to enhance online learning experiences and support student success:

Improve Technology Infrastructure: Educational institutions should invest in reliable internet connectivity, provide necessary devices to students who lack access,

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and ensure that online learning platforms are user-friendly and accessible. Technical support should be readily available to assist students in resolving any technical difficulties they may encounter.

Enhance Student Engagement: Implement strategies to promote active student engagement in online classes. This can include interactive discussions, group projects, and incorporating multimedia elements into course materials. Encourage instructors to use various instructional techniques that stimulate critical thinking and participation.

Provide Adequate Support Services: Offer comprehensive support services to students, including academic advising, tutoring, and counseling, to address their academic and personal needs. These services should be easily accessible and well-publicized to ensure students are aware of the resources available to them.

Offer Professional Development for Instructors: Provide training and professional development opportunities for instructors to enhance their skills in online teaching and learning. This can include pedagogical training on effective online instructional strategies, use of technology tools, and best practices for online assessment and feedback.

Conclusion

In conclusion, the study on the effects of online classes on the academic performance of undergraduate students during the COVID-19 period sheds light on the complexities and nuances of online learning and its impact on student outcomes. The findings highlight both the benefits and challenges associated with online classes, providing valuable insights for educational institutions, policymakers, and stakeholders.

Through an extensive literature review, the study synthesized existing research on online learning and academic performance. It explored various factors that influence academic performance in online learning environments and identified common challenges faced by students during the transition to online classes.

The study found that the impact of online classes on academic performance is not uniform. While some studies suggest no significant difference in performance between online and in-person classes, others indicate slightly lower performance in online settings. These findings underscore the need for a deeper understanding of the specific factors that contribute to academic success in online learning environments.

The study emphasizes the significance of technology access in online learning. Students with reliable internet connections, suitable devices, and access to necessary software and resources are more likely to have better academic outcomes. Educational institutions should prioritize providing equitable access to technology and offer support to students who lack the necessary resources.

Furthermore, the study highlights the crucial role of engagement and interaction in online classes. Students who actively participate in online discussions, engage with course materials, and interact with instructors and peers tend to have better academic performance. This finding emphasizes the importance of creating interactive and engaging learning environments in online settings.

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A positivistic paradigm and quantitative research procedures were utilized in the design of the study. A survey was used as the major data collection strategy for this cross-sectional research, and the results of the survey were analyzed. In order to carry out this study, a simple method of random sampling was used. For the purpose of data collection from University students who studied online , a standardized questionnaire was used. Both the instrument's reliability and its validity were put to the test (e.g., factor analysis, inter-item correlations). The information was subjected to a number of statistical examinations, including an analysis of variance (ANOVA), as well as a regression analysis.

Challenges identified in the study include technical difficulties, limited interaction and engagement, time management issues, home environment distractions, adaptation to new learning methods, and the lack of personal interaction and support. These challenges can negatively impact student performance and highlight the importance of addressing them to optimize online learning experiences.

Based on these findings, several recommendations can be made to enhance online learning experiences and support student success. These recommendations include improving technology infrastructure, promoting student engagement, providing support services, fostering social interaction, offering professional development for instructors, and continuously evaluating and improving online learning programs.

Limitations and Future Directions

While the study on the effects of online classes on the academic performance of undergraduate students during the COVID-19 period researcher provides a valuable insights, there are certain limitations that should be acknowledged:

Generalizability: The study focused on a specific population of undergraduate students during the COVID-19 period. The findings may not be generalizable to other educational levels or different contexts. Future research should consider expanding the study to include a more diverse sample and explore the effect of online classes on academic performance across different educational settings.

Self-reporting Bias: The study relied on self-reported data from surveys and questionnaires, which may be subject to response bias. Participants' responses may be influenced by social desirability or their perception of what is expected. Future research could consider incorporating objective measures of academic performance, such as official grade records or standardized test scores, to complement self-reported data.

Short-term Perspective: The study focused on the immediate effects of the transition to online classes during the COVID-19 period. Long-term effects on academic performance and the sustainability of online learning outcomes were not explored. Future research could investigate the long-term impacts of online classes on academic performance, considering multiple semesters or academic years.

External Factors: The study did not extensively examine the influence of external factors, such as socioeconomic status, family support, or individual characteristics, on

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academic performance in online learning environments. Future research should consider exploring the role of these factors in shaping student outcomes in online classes.

Quantitative Focus: The study primarily employed a quantitative research design, which limited the depth of understanding of students' experiences and perceptions. Future research could incorporate qualitative methods, such as interviews or focus groups, to gain a richer understanding of the challenges and benefits of online classes from the students' perspectives.

Based on these limitations, several future directions for research can be suggested:

Longitudinal Studies: Conduct longitudinal studies to track the academic performance of students over an extended period. This would allow for a better understanding of the sustained effects of online classes on academic performance and the factors that contribute to long-term success.

Comparative Studies: Conduct comparative studies to assess the differences in academic performance between online and in-person classes across different disciplines and educational levels. This would provide a more comprehensive understanding of the impact of online learning in various contexts.

In-depth Qualitative Research: Conduct in-depth qualitative research to explore students' experiences, perceptions, and attitudes towards online learning. This would provide deeper insights into the challenges and benefits of online classes and inform the development of effective strategies and interventions.

Contextual Factors: Investigate the influence of contextual factors, such as socioeconomic status, family support, and individual characteristics, on academic performance in online learning environments. This would help identify additional factors that may impact student outcomes and inform targeted support initiatives.

Comparative Analysis: Conduct comparative analyses of different online learning platforms and instructional strategies to identify best practices that enhance academic performance. This would provide guidance for educational institutions in designing effective online learning environments.

In summary, while the current study has provided valuable insights, future research should address the identified limitations and explore additional dimensions to enhance our understanding of the effects of online classes on academic performance. By addressing these limitations and pursuing future directions, researchers can further inform educational policies, improve online learning experiences, and support the academic success of undergraduate students.

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