

Original Article

**DISRUPTION OF TRADITIONAL LEARNING, DEVELOPMENT
OF ONLINE EDUCATION, AND STUDENTS' PERFORMANCE
DURING COVID-19 PANDEMIC**

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Abstract

The objective of this study is to compare the positive and negative impact of online learning started during COVID-19 Pandemic when all activities were suspended and the complete lockdown was placed all over the world. All types of educational institutions were closed and learning was shifted from physical to online. In order to understand benefits of online learning we collected primary data from 353 students of the Universities located in Multan city of Pakistan through a structured questionnaire, using semi-structured interview method. The students' performance during COVID-19 was taken as dependent variable while Ease of E-Learning, Behavioral intention, Teacher's Intention and Exam Mechanism were selected as independent variables. The findings reveal that majority of participants supported online learning methods to improve knowledge acquisition for all students, including high achievers, average learners, and those with low learning achievement. The study underscores the need to address technological barriers and provide resources and support for educators during the transition to remote synchronous education.

Key Words: disruption of traditional learning; learning barriers; online education; students' feedback; faculty dissatisfaction.

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1.Introduction

The eruption of the COVID-19 pandemic in 2019 had a profound impact on human life all over the world, affecting all sectors of the economies, including education. The pandemic necessitated drastic measures to minimize social contact and curb the virus's rapid spread, leading to the closure of physical classes and exams, and imposing restrictions on physical movement of students. Traditional education methods were replaced with online and remote learning, creating a significant shift in the educational learning landscape globally.

1.1 Background of the Study

The COVID-19 pandemic prompted governments to implement measures to reduce social contact. This included suspending face-to-face classes and transitioning to online education. Countries varied in their response, timelines, with some halting in-person classes immediately while others shifted online learning later. The shift to online education was facilitated by various tools and platforms such as Moodle, Blackboard, and Google's online classroom. However, this transition posed significant challenges, particularly for educators and students who lacked experience with online teaching and learning.

The effectiveness of online education was hindered by a lack of computer literacy among teachers and inadequate preparation for virtual learning environments. The absence of direct teacher supervision and the reliance on independent learning also contributed to the challenges. Furthermore, the pandemic created disparities in educational systems, with some institutions better equipped to handle the transition than others.

In the context of Pakistan, the literature on the impact of the pandemic on its educational system is still growing. There is a notable gap in research

focused on Pakistani university professors and their experiences with the transition to online education. This study aims to address this gap by exploring the challenges and benefits of online learning in Pakistan during the COVID-19 pandemic.

1.2 Objectives of the Study

The objectives of this research are listed below:

- To Study traditional learning methods of education in Pakistan.
- To analyze the challenges for development of online education system in Pakistan.
- To investigate the effects of the COVID-19 pandemic on the learning process.
- To Examine the impact of online learning on student performance.

1.3 Main Research Questions

Main research questions of the study are given below: -

- How did teachers manage online learning during the early phases of the COVID-19 pandemic?
- Is the interaction between teachers and students affected due to online learning?
- How can the relationship between students and teachers be improved in educational institutions?
- What challenges students faced during Covid-19 pandemic, and online learning negatively affected students' performance?

1.4 Contribution of study

This study makes several significant contributions to the understanding of the impact of the COVID-19 pandemic on the educational landscape, particularly in Pakistan. By focusing on Pakistani university professors, it addresses a notable gap in the existing literature, which has predominantly

concentrated on educational experiences in other countries such as China, Turkey, and Saudi Arabia. This research provides a more localized perspective, shedding light on the unique challenges and adaptations within the Pakistani context.

The study offers valuable insights into how educators and students in Pakistan adapted to the abrupt shift from traditional face-to-face education to online learning. It highlights various challenges they faced, including the lack of prior experience with digital tools and the difficulties in maintaining effective communication and engagement in a virtual environment. The strategies employed to overcome these obstacles contribute to a deeper understanding of the resilience and innovation demonstrated by educators and students during this unprecedented transition. Additionally, this research evaluates the effectiveness of various online education tools and methods used during the pandemic. By examining the practical implementation of platforms such as Moodle, Blackboard, and Google's online classroom, the study contributes to a better understanding of what works in remote learning environments. This evaluation is crucial for improving the overall quality of online education.

The rest of paper is organized as follows: section 2 contains literature review of relevant studies, identified research gap, novelty of study and development of hypothesis; section three explains data, methodology, selection of variables; section fourth comprises data analysis and results; section five contains discussion and section sixth consists of conclusion, policy recommendations, limitations and suggestions for further research

2.Literature Review

The existing literature provides a broad overview of the impact of the COVID-19 pandemic on education, highlighting various dimensions such

as student performance, online learning tools, and the adaptation of traditional education methods to remote learning environments. Mseleku (2020) demonstrated that emergency remote teaching could improve student performance, but highlighted the need for appropriate tools and methods for effective implementation. Gopal et al. (2021) revealed a positive correlation between student satisfaction and performance, emphasizing the importance of well-designed online courses. Chisadza et al. (2021) identified factors influencing student performance during online learning, such as Wi-Fi connectivity and preferred learning methods, while Totlis et al. (2021) noted that despite technological advancements, students still favored traditional face-to-face learning, particularly in subjects like anatomy. Wang et al. (2021) investigated the impact of online learning on standardized test results, finding moderate benefits in subjects like mathematics and natural sciences. Agustina and Cheng (2020) compared the effectiveness of online and traditional learning, revealing significant challenges in online education, especially in developing countries like Indonesia. Asgari et al. (2021) highlighted the logistical, technical, and motivational challenges of online engineering education, and Radha et al. (2020) explored students' attitudes towards e-learning, noting a general favorability but also a need for more interactive and engaging modes. Adedoyin and Soykan (2023) distinguished between emergency remote teaching and well-planned online education, stressing the need for proper planning and design in online instructional programs,

These studies provide mixed results neither totally supporting online learning nor favoring physical education because both types of learning systems have some merits and demerits. The review of these studies also illuminated research gaps, inviting fresh research on both types of

educational systems.

2.1 Identification of Research Gap

While the literature extensively covers various aspects of online learning during the COVID-19 pandemic, a notable gap exists in the specific context of Pakistani university professors and their experiences with the transition to online education. Most studies focus on other countries, leaving a lack of localized insights into the challenges and adaptations faced by educators and students in Pakistan. Additionally, there is limited research on the long-term impacts of this sudden shift on student performance and teacher-student interactions in the Pakistani educational system.

2.2 Novelty of the Study

This study aims to fill the identified research gap by focusing on the experiences of Pakistani university professors during the COVID-19 pandemic. It will provide localized insights into the challenges and benefits of transitioning to online education in Pakistan, which has been underrepresented in the existing literature. The study will also explore the long-term impacts of online learning on student performance and teacher-student interactions, offering practical recommendations for improving online education practices in Pakistan. Although the results of this study are localized but they can be generalized in other parts of the world because every country have faced Covid-19 pandemic and in the light of the findings of this study the policymakers of other countries can also devised effective policies to cope with extra-ordinary situation like Covid-19 pandemic.

2.3 Development of Hypotheses

Based on the literature review and the identified research gap, the following pairs of hypotheses are developed to test them through data to be collected from real life:

1. Ho: Poor digital infrastructure and problem of internet connectivity and

related cost cannot significantly impact the effectiveness of online learning and students' performance.

H₁: Poor digital infrastructure and problem of internet connectivity and related costs can significantly impact the effectiveness of online learning and students' performance.

2. H₀: Teachers in Pakistani universities did not face significant challenges in managing online classes during Covid-19 pandemic.

H₁: Teachers in Pakistani universities faced significant challenges in managing online classes during Covid-19 pandemic.

3. H₀: The interaction between teachers and students was not adversely affected due to shift to online learning.

H₁: The interaction between teachers and students was adversely affected due to the shift to online learning.

4. H₀: Performance of students in online learning environment was not affected compared to traditional face-to-face learning environment.

H₁: The performance of students in online learning environment was affected compared to traditional face-to-face learning environments.

3.Data and Methodology

3.1 Research Design

The research design for this study is based on a field survey using self-developed questionnaires to collect primary data. The study employs a simple random sampling technique to ensure that each participant has an equal chance of being selected. The data collection process involves administering a questionnaire personally by the researcher to gather relevant information on the selected variables. The primary data collected is then coded, organized, and summarized for analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations are used

to explain the characteristics of the variables. Additionally, inferential statistics, including correlation and regression analysis, are employed to determine the relationships between the variables. The participants fully disclosed the purpose of collecting data and they were assured that the information provided by them would be kept secret and only be used for research purpose. They were provided necessary help in reading and comprehending the contents of questionnaire.

3.2 Sample of the Study

The sample of study was collected from the universities located in Multan city. The selected universities are the following: -

- Institute of Southern Punjab, Multan
- Bahauddin Zakariya University, Multan
- Emerson University, Multan
- NCBA & E, Multan

Using a simple random sampling method, a diverse group of students from these universities is selected to participate in the study. This approach ensures that the sample is representative of the broader student population at these institutions. The total number of participants is determined based on the need to achieve a statistically significant sample size that allows for reliable analysis and conclusions. The data was collected from 353 participants through random sampling method.

3.3 Selected Variables

The dependent variable of the study was student performance during COVID-19 while independent variables include, Ease of E-Learning, Behavioral Intention, Teacher's Intention and Exam system

3.4 Analytical techniques

After the collection of primary data, responses are coded and organized for analysis. The data was analyzed using Microsoft Excel and the Statistical

Package for Social Sciences (SPSS). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to describe the characteristics of the variables. Inferential statistics, such as correlation and regression analysis, were employed to explore the relationships between the independent variables (Ease of E-Learning, Behavioral Intention, Teacher's Intention, Exam mechanism) and the dependent variable (Student Performance during COVID-19). This comprehensive analysis provides insights into the factors influencing student performance during the pandemic and helps in validating the hypotheses.

3.5 Conceptual Model

The conceptual model of this study, as depicted in [Figure 1](#), illustrates the impact of selected factors on the working environment and how they affect student performance during the COVID-19 pandemic. This model hypothetical direction and the analysis of the relationships between the dependent and independent variables.

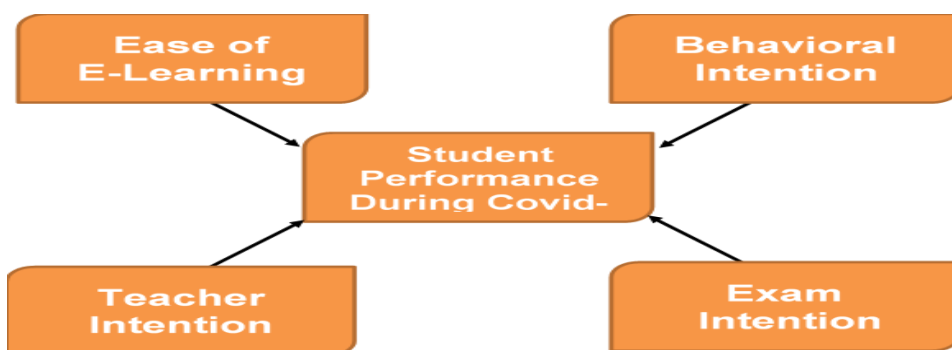


Fig 1: Conceptual framework

4.Results

First of all, we describe demographic characteristics of participants to

understand their age, gender and education levels.

4.1 Demographic Characteristics of participants

The demographic characteristics of participants are presented in [Table 1](#).

Table 1: Demographic characteristics of respondents

	N	Min	Max	Mean	Std. Dev	Freq	Percentage
Age	353	1	3	1.42	0.506		
18-25						206	58.4
26-35						145	41.1
36-50						2	0.6
>50							
Gender	353	1	2	1.67	0.47		
Male						116	32.9
Female						237	67.1
Education	353	1	5	3.1	1.066		
PHD						3	0.8
M.Phil.						126	35.7
Master						105	29.7
Bachelor						70	19.8
Intermediate						49	13.9

The results in [Table 1](#) show that majority of respondents were between the ages of 18-25, accounting for 58.4 percent of the sample. Similarly, 145 (41.1%) respondents were between the age of 26-35, while only 2 (0.6%) were between the age of 36-50. No response was obtained from the age group older than 50 years. There were 237 female participants who gave all requested information, and 116 males who filled out the entire questionnaire. This means that men made up 32.9 percent of the sample and

women were 67.1 percent. Out of total number of samples, around 3 (0.8%) were Ph.D. Scholars, 126 (35.7%) were M.Phil. Students, 105 (29.7%) were Master Students, 70 (19.8%) were Bachelor Students and 49 (13.9%) were Intermediate Students

4.2 Analysis of statements

The participants gave answer to every question, which was in statement format. Their answers to the statement are summarized in [Table 2](#).

Table 2: Descriptive Statistics

No	Statements	SA	A	N	DA	SDA	%	M.S	S. D
1	You feel confident while using e-learning system.	15.3	61.5	6.5	6.8	9.9	100.0	2.35	1.125
2	You feel confident while operating e-learning platforms.	17.3	49.3	21.2	1.1	11.0	100.0	2.39	1.128
3	You feel confident while using online learning contents.	19.8	47.0	11.0	7.9	14.2	100.0	2.50	1.288
4	E-learning platforms are user-friendly.	18.1	64.9	11.9	2.5	2.5	100.0	2.07	.793
5	It would be easy for you to find the necessary information through the E-learning platform.	20.4	61.2	13.9	2.8	1.7	100.0	2.04	.780

6	Using an e-learning service can simplify the learning process.	16.1	58.1	9.6	10.5	5.7	100.0	2.07	1.042
7	The e-learning service is compatible with the way you learn.	15.6	59.2	12.7	6.8	5.7	100.0	2.31	1.045
8	E-learning updates your subject knowledge.	18.1	49.0	18.1	11.3	3.4	100.0	2.33	1.008
9	You intend to use e-learning as an autonomous (free) learning tool.	15.6	59.2	12.7	6.8	5.7	100.0	2.28	.995
10	You are confident to avail effective instruction in E-learning from teachers.	18.4	55.2	12.5	5.9	7.9	100.0	2.30	1.084
11	You are confident to get valuable learning from recorded lectures provided by teachers.	18.4	55.2	13.0	10.5	2.8	100.0	2.24	.966
12	You feel comfortable to schedule of online lectures.	15.0	46.5	19.3	12.2	7.1	100.0	2.50	1.106
13	Online learning is better than physical learning.	15.9	29.5	9.3	28.9	16.4	100.0	3.01	1.371

14	E-learning saves substantial cost and feels comfortable with online learning.	17.0	53.0	15.9	11.0	3.1	100.0	2.30	.981
15	your online learning experience was worse than Physical learning.	19.0	45.0	20.1	15.6	.3	100.0	2.33	.966
16	It is more difficult to understand the material with E-learning.	17.0	53.0	15.9	11.0	3.1	100.0	2.39	.913

The statement # 1 (You feel confident while using e-learning system) show that 15.3 % of sampled students strongly agree with the above statement, 61.5 % agreed with the above statement, and 6.5 % of students were neutral. In comparison, 6.8 % of sampled students disagreed with the above statement, and 9.9 % of sampled students strongly disagreed with the above statement. The calculated value of statement is statistically significant.

The results of statement # 2 (You feel confident while operating e-learning functions) show that 17.3 % of sampled students strongly agree with the above statement, 49.3 % agreed with the above statement, and 21.2% of sampled students were neutral. In comparison, 1.1 % of sampled students disagreed with the above statement, and 11.0 % of sampled students strongly disagreed with the above statement. The calculated value of statement is statistically significant.

The results of statement # 3 (You feel confident while using online learning platform) show that 19.8 % of sampled students strongly agree with the above statement, 47.0 % were also agreed. However, 11.0% of sampled

students were neutral, and did not give their opinion. In comparison, 7.9 % of sampled students disagreed with the above statement, and 14.2 % of sampled students strongly disagreed above statement. The calculated value of statement is statistically significant.

The statement # 4 (E-learning platforms are user-friendly) show that 18.1 % of sampled students strongly agree with this statement, 64.9 % were also agreed, and 11.9% were neutral and did not give their views. In comparison, 2.5 % of sampled students disagreed and 2.5 % were strongly disagreed with the statement. The calculated value of statement is statistically significant.

The statement # 5 (It would be easy for you to find the necessary information through the E-learning platform) show that 20.4 % of sampled students strongly agree with the statement, 61.2 % were also agreed, and 13.9% shown their neutrality. In comparison, 2.8 % of sampled students disagreed with the statement, and 1.7 % were also strongly disagreed with the statement. The calculated value of statement is statistically significant.

The statement # 6 (Using an e-learning service can simplify the learning process) show that 16.1 % of sampled students strongly agree with this statement, 58.1 % were also agreed, and 9.6 % of sampled students were neutral. In contrast, 10.5 % of sampled students disagreed, and 5.7 % strongly disagreed with the statement. The calculated value of statement is significant statistically.

The statement # 7 (The set-up of the e-learning service is compatible with the way you learn) show that 15.6 % of sampled students strongly agree with the above statement, 59.2 % agreed with the above statement, and 12.7 % of sampled students were neutral on the above statement. In comparison, 6.8 % of sampled students disagreed above statement, and 5.7 % of sampled students strongly disagreed above statement. The calculated value of

statement is statistically significant.

The statement # 8 (E-learning updates your subject knowledge) show that 18.1 % of sampled students strongly agree with this statement, 49.0 % were also agreed, and 18.1 % of sampled students were neutral. In contrast, 11.3 % of sampled students disagreed, and 3.4 % of sampled students strongly disagreed with statement. The calculated value of statement is statistically significant.

The statement # 9 (You intend to use e-learning as an autonomous (free) learning tool) show that 15.6 % of sampled students strongly agree, and 59.2 % agreed with this statement, and 12.7 % of sampled students were neutral. In contrast, 6.8 % of sampled students disagreed, and 5.7 % strongly disagreed with the statement. The calculated value of statement is statistically significant.

The statement # 10 (You are confident to avail effective instruction from teachers through E-learning) show that 18.4 % of sampled students strongly agree, and 55.2 % agreed, and 12.5 % of sampled students were neutral. In contrast, 5.9 % of sampled students disagreed, and 7.9 % also strongly disagreed with statement. The calculated value of statement is statistically significant.

The statement # 11 (You are confident to get valuable learning from recorded lectures provided by teachers) show that 18.4 % of sampled students strongly agree, and 55.2 % agreed with the statement, and 13.0 % of sampled students did not give their views. In contrast, 10.5 % students disagreed, and 2.8 % also strongly disagreed with the statement. The calculated value of the statement is statistically significant.

The statement # 12 (You feel comfortable to schedule of online lectures) show that 15.0 % of sampled students strongly agree, 46.5 % also agreed,

and 19.3 % were neutral. In contrast, 12.2 % of sampled students disagreed, and 7.1 % of sampled students strongly disagreed with the statement. The calculated value of the statement is statistically significant.

The statement # 13 (Online learning is better than physical learning) show that 15.9 % of sampled students strongly agree, 29.5 % also agreed with the statement, and 9.3 % of sampled students were neutral. In contrast, 28.9 % of sampled students disagreed, and 16.4 % were also strongly disagreed with the statement. The calculated value of statement is statistically significant.

The statement # 14 (E-learning is very cheap and affordable) show that 17.0 % of sampled students strongly agree, 53.0 % were also agreed with the statement, and 15.9 % were neutral. In contrast, 11.0 % of sampled students disagreed, and 3.1 % were also strongly disagreed with statement. The calculated value of statement is statistically significant.

The statement # 15 (your learning experiences online classes are worse than in physical classes) show that 19.0 % of sampled students strongly agree with the statement, 45.0 % agreed, and 20.1 % were neutral. In contrast, 15.6 % of sampled students disagreed, and .3 % also strongly disagreed with the statement. The calculated value of statement is statistically significant.

The statement # 16 (It is more difficult to understand the material with E-learning.) show that 17.0 % of sampled students strongly agree, and 53.0 % were also agreed with the statement, and 15.9 % were neutral. In contrast, 11.0 % of sampled students disagreed, and 3.1 % were also strongly disagreed above statement. The calculated value of statement is statistically significant.

4.4 Statistical analysis

4.4.1 Reliability Test

The results of Cronbach Alpha Test are presented in [Table 3](#).

Table 3 Results of reliability & validity test

Factor	Cronbach's Alpha	No of Items	Reliability	Conclusion
Self-Efficiency of using online learning	.803	3	Good	Reliable and valid
Ease of E-learning	.760	4	Good	Reliable and valid
behavior Intention	.846	2	Good	Reliable and valid
Teacher Intention	.759	3	Good	Reliable and valid
Exam system	.707	4	Acceptable	Reliable and valid

The reliability of the constructs was calculated using Cronbach's Alpha. A reliable construct is valid with Alpha (t) score of .70 or higher as suggested by (Hair et al., 2013). The results in table 3 reveals that the Self-Efficiency of using E-learning with three items ($\alpha = .803$) was good, the Ease of E-learning scale with four items ($\alpha = .760$) was found reliable, Behavioral Intention scale with two items also found reliable ($\alpha = .846$) and Teacher Intention scale with three items was reliable ($\alpha = .759$). Furthermore, exam system satisfaction scale was also found acceptable ($\alpha = .707$).

4.4.2 Correlation Matrix

The estimated results of correlation matrix are exhibited in [Table 4](#).

Table 4 Estimated Results of Correlation Analysis

		MSEEL	SPDCOV
Ease & Self-Efficiency of E-learning	Pearson Correlation	1	.664**
	Sig. (2-tailed)		.000
	N	353	353
Student Performance during Covid	Pearson Correlation	.664**	1
	Sig. (2-tailed)	.000	
	N	353	353

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

Table 4 shows the Pearson correlation coefficients between Ease & Self-Efficiency of E-learning (E&SEEL) and Student Performance during Covid (SPDCOV). The results show that there is a strong positive correlation (0.664) between Ease & Self-Efficiency of E-learning and Student Performance during Covid. The correlation between these two variables is statistically significant ($p < 0.01$), indicating that the relationship between Ease & Self-Efficiency of E-learning and Student Performance during Covid is unlikely to be due to chance. The significance level of 0.01 means that there is a 1% chance of observing a correlation as strong as 0.664 between Ease & Self-Efficiency of E-learning and Student Performance during Covid. This indicates that as students perceive e-learning as easier and feel more self-efficient, their performance during Covid tends to improve. The correlation is statistically significant at the 0.01 level ($p < 0.01$), meaning there is only a 1% chance that this correlation is due to random variation. Hence, we can be confident that the observed relationship

is real and not by chance.

4.4.3 ANOVA Test

The dependent variable is Student Performance during Covid-19 (SPDCOV) and independent Variables are: Ease and Self-Efficiency of E-learning (MSEEL), Behavioral Intention, Teacher's Intention, Exam System. The estimated results of ANOVA are given in [Table 5](#)

Table 5. Estimated Results of ANOVA

Statistic	Value
Sum of Squares	
Regression	155.783
Residual	197.938
Total	353.720
Degrees of Freedom (df)	
Regression	1
Residual	351
Total	352
Mean Square	
Regression	155.783
Residual	0.564
F-Statistic	276.248
Significance (Sig.)	0.000

The results of ANOVA test show that the model is statistically significant, with an F-value of 276.248 and a p-value of 0.000. This indicates that the independent variables (Ease and Self-Efficiency of E-learning, Behavioral Intention, Teacher's Intention, Exam System) collectively predict the

dependent variable (Student Performance during Covid-19) significantly better than a model with no predictors. The regression model explains a significant portion of the variance in student performance during Covid-19. The model summary is presented in [Table 6](#).

Table 6 Model Summary

Statistic	Value
R (Correlation Coefficient)	0.664
R Square (Coefficient of Determination)	0.440
Adjusted R Square	0.439
Std. Error of the Estimate	0.75095

The R value of 0.664 indicates a strong relationship between the independent variables and the dependent variable. The R Square value of 0.440 means that approximately 44% of the variance in Student Performance during Covid-19 is explained by the independent variables in the model. The Adjusted R Square value (0.439) is very close to the R Square value, indicating that the model is a good fit and that the independent variables reliably predict the dependent variable. The standard error of the estimate (0.75095) provides a measure of the average distance that the observed values fall from the regression line. Lower values indicate a better fit of the model.

4.4.4 Normality test

This test is used to identify normal distribution of data and the results are presented in [Figure 2](#).

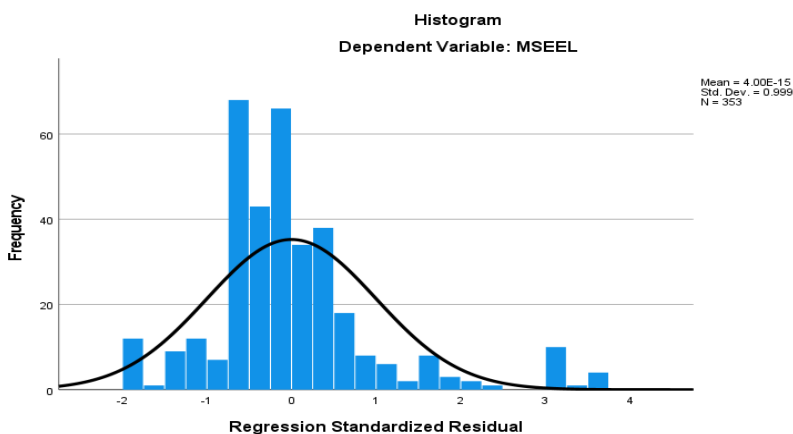


Fig 2 Normality Test

The curve in the histogram chart graphic above hit the bell at point 0, As a result, we can conclude that the data followed a normal distribution, as was predicted.

5. Discussion

The study explores the experiences of student performance during COVID the rapid transition from onsite to remote synchronous teaching due to the COVID-19 pandemic. The study used semi-structured interviews to gather data and identified seven themes related to the participants' experiences and concerns, including barriers to transition, classroom management, teaching, faculty dissatisfaction, effective transition resources, and lessons learned. Technological barriers, particularly internet-related technology issues, were found to be a predominant theme, presenting obstacles related to bandwidth and connectivity for both students and faculty. The first hypothesis (**H₀**) which states that “*Poor digital infrastructure and problem of internet connectivity and related cost cannot significantly impact the effectiveness of online learning and students' performance*” is rejected and alternate hypothesis (**H₁**) which states that “*Poor digital infrastructure and problem*

of internet connectivity and related cost can significantly impact the effectiveness of online learning and students' 'performance' was accepted. The findings further reveal that teachers faced great difficulties in managing classes at the early stage of COVID-19 pandemic due to lack of expertise about the use of relevant technologies and methods of conducting online classes. Thus, second null hypothesis (**H₀**) which states that *"Teachers in Pakistani universities did not face significant challenges in managing online classes during Covid-19 pandemic"* is rejected and alternate hypothesis (**H₁**) which postulates that *"Teachers in Pakistani universities faced significant challenges in managing online classes during Covid-19 pandemic"* is accepted.

The findings of the study also disclosed that interaction between teachers and students was adversely affected due to shifting of classes online and both teachers and students had to interact virtually as physical interaction was not possible. This prevents teachers to communicate with students effectively and transfer their ideas properly particularly in scientific subjects. Thus, third hypothesis (**H₀**) which states that *"the interaction between teachers and students was not adversely affected due to shift to online learning"* is rejected and alternate hypothesis (**H₁**) which states that *the interaction between teachers and students was adversely affected due to the shift to online learning"* was accepted. These findings highlight the facts that online education in all subjects and courses are not effective and it should be devised according to nature of subjects or courses in consultation with relevant teachers. The results of correlation analysis shows that there is a strong positive correlation (0.664) between Ease & Self-Efficiency of E-learning and Student Performance during COVID-19. The correlation between these two variables is statistically significant, indicating that as students perceive e-learning as easier and feel more self-

efficient, their performance during Covid tends to improve. The results of ANOVA test also confirm the findings of Correlation analysis as the model is statistically significant, suggesting that the independent variables (Ease and Self-Efficiency of E-learning, Behavioral Intention, Teacher's Intention, Exam System) collectively predict the dependent variable (Student Performance during Covid-19) significantly. The regression model explains a significant portion of the variance in student performance during Covid-19. The fourth null hypothesis (**H₀**) which states that performance of students in online learning environment was not affected compared to traditional face-to-face learning environment" was accepted because students' performance was improved as he felt ease and his efficiency of e-learning was improved. Here, the possible explanation may be given that the use of unfair means during online examinations was possible. This is the reason that some participants emphasized that the development of foolproof mechanism to remove the possibility of dishonesty, cheating and use of unfair means during online examinations.

The empirical analysis reveal that majority of students supported online teaching and found it more convenient and less costly. They expressed desire to avail online learning in future. However, some participants fear that all courses could not be taught online. In this way, the study highlights the merits and demerits of both types of learning systems. Some participants declare face-to-face learning more valuable and effective as it enhances interaction between teachers and the students. In contrast, some opposes it because there is no check on the regular attendance of students in online learning. Total shifting to online learning will weaken the teacher-students' interaction. Recording lectures and ensure connectivity for online learning also involve heavy financial investment but in the long run this cost will

reduce as the number of students are increased.

6. Conclusions

The study sheds light on the experiences and concerns of educators during the transition to remote synchronous teaching, with a focus on technological barriers and the need for support and resources. Online learning was found to be more efficient than traditional as a learning tool in the present era, with online groups outperforming traditional groups in terms of literal reading comprehension and performance in contemporary learning environments. Students who learn online tend to outperform those who learn through traditional techniques, although their performance may be lower than that of in-person learners. The study's findings support the use of online learning methods to improve knowledge acquisition for all students, including high achievers, average students, and those with low achievement. Thus, we can conclude that Online learning fosters group communication and provides opportunities for meaningful discussions and collaborative learning, creating a more inclusive and engaging classroom environment.

6.1 Policy Implications

The foremost policy implication is that technological barriers must be removed before initiating online learning. The Government and higher educational institutions should invest in building internet infrastructure particularly in the remote and rural areas to ensure equitable access to those students who are living in the remote areas of Pakistan. Policy framework should be developed in such a way that it ensures the availability of reliable and affordable internet access and other relevant technological resources to the faculty and the students. The capacity of teachers should be built to equip with skills required for effective online teaching through training programs. Continuous professional development opportunities must be

provided to the faculty to have command over online learning technologies and methodologies. There is also need to balance online and in-person learning by developing hybrid model that combines both types of learning systems by removing their weakness. There must be policy mechanism that ensure that specific subjects or courses that require student-teacher physical interaction should not be offered online. Similarly, measures should be taken to prevent academic dishonesty or cheating in online assessment to maintain credibility of online education. The policy makers should devise policies to promote a culture of academic honesty among students and faculty. The initial investment in infrastructure and technology should be considered as long-term investment that will gradually reduce costs with the increase participation of students in online learning. Private sector companies are encouraged to share financial burden of educational institutions and contributes into improvement of learning among the students of remote areas.

62. General impact

The study also delves into the effects of online learning on student performance, offering critical insights into how distance education influences educational outcomes. Understanding these effects is essential for educators and policymakers as they seek to mitigate any negative impacts and enhance the effectiveness of online learning. By providing evidence-based findings, the research supports the development of strategies to improve student performance in virtual settings. Furthermore, the research explores the changes in teacher-student interactions due to online learning. It identifies the challenges in maintaining strong, supportive relationships and offers recommendations for improving these interactions in virtual settings. This aspect of the study is particularly

important as it addresses the social and emotional dimensions of learning and this is vital for student success. Finally, the findings of this study can help educational institutions and policymakers develop better strategies for integrating online learning into traditional education systems. By understanding the experiences and lessons learned during the pandemic, stakeholders can ensure that both teachers and students are better prepared for future disruptions.

6.3 Limitations of study

Despite valuable contribution, this study has certain limitations: -

This research is based on primary data which was collected through semi-structured interviews and it may not capture the full range of experiences and perspectives of all students and educators. Moreover, the findings are context-specific and may not be generalizable to all educational institutions of other countries or regions. The study just focused on technological barriers, ignoring other important factors such as pedagogical practices and student engagement, which also influence online learning experience. Additionally, the study just focuses on immediate transition period of COVID-19 and does not consider long term adaptations and improvement that may have occurred in remote learning environment. The sample size of the study is very small and as such the findings of the study may not be very effective.

6.3 Suggestions for future research

In the light of above limitations, the following suggestions are made for future research.

There is need to conduct longitudinal studies to assess the long-term impact of remote synchronous teaching on student performance and educational outcomes. It will enable us to understand how students and educators adapt to online learning over time and the evolution of

technological and pedagogical practices. The future studies can compare the effectiveness of different online learning models (e.g., synchronous vs. asynchronous) across various subjects and educational levels. This will help us understand the difference in learning outcomes between fully online, hybrid, and traditional in-person education. The future studies should explore additional factors influencing online learning experiences, such as student motivation, engagement, and the effectiveness of different teaching strategies. Future studies can also include a more diverse range of participants to understand the unique challenges and experiences of different demographic groups, including students with disabilities and those from different cultural backgrounds. There is also a need to bridge digital divide created between privilege and disadvantaged students. Future studies can focus on emerging technologies such as artificial intelligence and virtual reality, on the effectiveness and accessibility of online learning. Investigate the potential of adaptive learning technologies to personalize education and improve outcomes for all students.

Thus, addressing these policy flaws and executing suggestions, policymakers and educational institutions can improve the effectiveness and inclusivity of online learning system.

Data statement

The data that used in this study will be made available on strong request.

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