



Impacto del COVID-19 en la Educación Superior en Pakistán: un estudio exploratorio

Impact of COVID-19 on Higher Education in Pakistan: An Exploratory Study

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RESUMEN.

El brote del COVID-19 obligó a las Instituciones de Educación Superior (IES) de todo el mundo a continuar sus programas de grado en línea al instante. Siguiendo la tendencia, la Comisión de Educación Superior de Pakistán alentó a las IES a comenzar las clases en línea. Aunque el aprendizaje en línea parecía ser la mejor solución posible durante el cierre indefinido de los institutos, el cambio repentino en el paradigma de enseñanza y aprendizaje no fue bien aceptado y surgieron desafíos sin precedentes. Este estudio tiene como objetivo identificar las barreras específicas para estudiantes y profesores en este cambio abrupto. Además, examina el nivel de satisfacción de los estudiantes de pregrado con las prácticas de educación en línea durante la epidemia del COVID-19. El estudio empleó un diseño de encuesta y lo llevó a cabo a través de dos cuestionarios distintos para estudiantes y profesores. Un total de 1280 estudiantes participaron en el cuestionario de los estudiantes, mientras que 112 maestros contribuyeron a completar la encuesta de docentes. La calidad del contenido (CQ), la disponibilidad del contenido (CA), la interacción del maestro (TI) y el modo de impartición de la conferencia (MLD) se consideraron como variables predictoras de la satisfacción del estudiante. Se realizaron análisis de regresión y correlación para conocer la contribución de las variables mencionadas. Los resultados de la encuesta concluyeron que la falta de interacción entre estudiantes y profesores es el principal obstáculo en el aprendizaje en línea. Los resultados de la regresión revelaron que el modelo general con los cuatro predictores fue significativamente predictivo de la satisfacción de los estudiantes. Los resultados revelaron además que MLD es el más fuerte y significativo de todos. Creemos que los hallazgos de este estudio pueden proporcionar información beneficiosa para mejorar el cambio de paradigma con mayor eficiencia en esta pandemia.

PALABRAS CLAVE.

Pandemia, aprendizaje en línea, interacción, regresión.



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ABSTRACT.

The outbreak of COVID-19 forced Higher Educational Institutions (HEI) across the world to continue their degree programs online instantly. Following the trend, the Higher Education Commission of Pakistan encouraged HEIs to begin online classes. Although online learning seemed to be the best possible solution during the indefinite closure of institutes, however, the sudden change in teaching and learning paradigm was not well accepted and unprecedented challenges emerged. This study aims at identifying the barriers specific to students and teachers in this abrupt shift. Moreover, it examines the satisfaction level of undergraduate students regarding online education practices during the COVID-19 epidemic. The study employed a survey design and carried it out through two distinct questionnaires that are, for students and teachers. A total of 1280 students participated in students' questionnaire while 112 teachers contributed to filling out teachers' survey. Content Quality (CQ), Content Availability (CA), Teacher Interaction (TI), and Mode of Lecture Delivery (MLD) were considered as the predictor variables for student satisfaction. Regression and correlation analyses were performed to find out the contribution of the aforementioned variables. The survey results concluded that the lack of interaction among students and teachers is the major hurdle in online learning. Regression results revealed that the overall model with all four predictors was significantly predictive of student satisfaction. The results further revealed that MLD is the strongest and most significant of all. We believe the findings of this study can provide beneficial insights in improving the paradigm shift with greater efficiency in this pandemic.

KEY WORDS.

Pandemic, online learning, interaction, regression.

1. Introduction.

COVID-19 is the disease caused by the novel coronavirus (World Health Organization, 2019) which has been labeled as pandemic and distressed the nations to their core. It has not only caused the disruption in the everyday activities of a common man but had ultimately brought the countries across the world to near standstill. This virus is highly contagious and spreads rapidly within and across cities. The virus emerged in December 2019 in China and spread exponentially all over the world and was declared as pandemic by World Health Organization on March 11, 2020 (World Health Organization, 2020b). As there is no vaccine or cure available for this disease to date, the only way to control or prevent its outbreak is to avoid being exposed to the virus (CDC, 2020). Governments across the world have imposed severe lockdowns to prevent further spread of the virus (Haelle, n.d.). Consequently, all non-essential services such as restaurants, parks, museums etc. have been temporarily closed and offices were shifted to "Work from home" mode. Educational institutions too had to suspend their academic activities keeping in view the safety of students (Sahu, 2020)(ECW, 2020). This lock down caused educational institutions to face unprecedented challenges to cope with re-adjusting of their academic calendar and to continue their academic activities in a completely different manner. Similarly, to control the spread of COVID-19 in Pakistan, all educational





institutions were closed right after the first case was reported, that is, in February 2020. The academic activities on campus remain suspended as of September 2020. Due to the uncertainty of the pandemic, tough decisions were taken to minimize the effects on education. Examinations of all students, up to high school, were cancelled and students were promoted to their succeeding classes. However, the council of Higher Education in Pakistan directed all universities to continue their classes and examinations online (Pakistan Today, 2020). This sudden shift in paradigm created havoc in the university students, while creating an extra burden for teachers due to this new way of learning and delivering education. Both the students and teachers were affected by the rapid paradigm shift in learning (Means et al., 2020). Teachers, who had been teaching in traditional way since decades, had to switch to online mode with minimum or no training. Likewise, the students habitual of learning in physical settings were reluctant to accept this new mode of learning. Moreover, students and teachers were more likely to have limited computing devices and poorer internet connection at home. Additionally, the courses were shifted without adopting proper research-based practices for effective online learning. Hence, the quality of online learning embraced during this pandemic was critical. To assess quality of online learning, student satisfaction is one of the key elements identified by Online Learning Consortium (J. C. Moore, 2005). Therefore, the main objective of this study is to identify the hurdles with respect to students and teachers during the shift from face to face to online learning due to COVID-19. Furthermore, it explored the factors that can predict student satisfaction within online learning environment that consist of content quality, content availability, teacher interaction and mode of lecture delivery. The major contribution of this study includes: 1. Analyzing students' barriers to online learning during COVID-19. 2. Investigation of teachers' issues in the instant shift adopted in the pandemic. 3. Measuring satisfaction level of students who were made to switch their mode of learning from physical to online classes due to indefinite suspension of on-campus classes. The rest of the paper is divided into four sections. Section 2 presents the literature review, Section 3 describes the methodology adopted in this study, Section 4 discusses the results with respect to research questions and Section 5 concludes the paper.

2. Background and Literature Review.

The epidemic of COVID-19 forced universities to shift their education process online in order to avoid catastrophic effects on higher education. Online learning, a descendent of distance education, is an adaptable and flexible way of learning that relies on Internet. It started with the evolution of World Wide Web in 1990's followed by a more structured approach of course management systems and presently offer Massive Open Online Courses (MOOC) (Hill, 2012)(Harasim, 2000)(Liang & Victor, 2012). Online learning has now become a part of many institutions' course offerings around the world; Harvard, MIT, Stanford, the University of California–Berkeley, to name a few. Online learning setting demands rigorous e-instructional method, dedicated student/teacher and phenomenal support from administrative staff (Li & Akins, 2005). According to Restauri et al. (Restauri et al., 2001), improper functioning technology could hinder the learning if students and teachers have to spare time and resources to access simple content. Although, online learning is beneficial for students in many respects but course content development for online courses is very challenging. The





course instructors and designers have to put extra effort to develop online content and assess student's performance as compared to face to face teaching. Shuey (Shuey, 2002) highlighted in his study that adaption of certain activities (performance assessments, virtual discussions, continuous assessment and proctored tests) is more difficult in online teaching. Furthermore, student feedback is one of the major issues due to lack of face to face interaction and different ways must be adopted by teachers to keep the students motivated. Therefore, finding out the level of student satisfaction in online learning becomes more complex. The parameters of student satisfaction are completely different for online learning as compared to traditional learning. Researchers have largely investigated student satisfaction in online learning and identified interaction as one of its key predictors (Ali et al., 2011)(Joksimović et al., 2015). Moore (M. G. Moore, 1989) proposed an interaction framework to evaluate how students build knowledge in online learning. It includes three types of interaction i.e. learner-learner, learner-instructor, and learner-content that later on serves as the basis for numerous research studies. Alqurashi (Alqurashi, 2019) surveyed 167 higher education students in the Pennsylvania state of USA, and using regression analysis, revealed that interaction of students with instructor, with content and among students along with online learning self-efficacy determine satisfaction. Kuo and Belland (Y.-C. Kuo & Belland, 2016) also perform regression analysis over survey results of 167 undergraduates in USA, and discovered that interaction with content and instructor were significant predictors of satisfaction. Likewise, Kuo et al. (Y. Kuo et al., 2013) used regression analysis on the surveyed data of 102 higher education students in the USA, and concluded that students' interaction with instructors, with the course materials, as well as internet self-efficacy are good predictors of satisfaction. Afzaal and Israr (Ali et al., 2011) investigated the quality of distance education in Pakistan and surveyed 245 students of Allama Iqbal Open University (AIU). In their study, they examined student satisfaction by performing regression analysis over instructors' performance, course evaluation, and student-instructor interaction factors. Scholars also mentioned the quality of lecture, familiarity with technology use and perceived learning as significant predictors for student satisfaction in an online setting (Martin et al., 2020) (Sears et al., 2017) (Lee, 2010) (Liu et al., 2009). In the above mentioned studies, educationists explored student satisfaction with those online courses in which students enrolled themselves by their choice. However, few studies have been carried out to assess student satisfaction in online learning in case of a disaster or crisis, such that, the students are made to switch their mode of learning from physical to online classes. Nevertheless, following researches are carried out during COVID-19. Karada (Karada, 2020) developed 'Distance Education Satisfaction Scale' (DESS) and investigated Turkish universities. DESS was based on 5 subscales which evaluate the satisfaction with (i) Higher education council (ii) University management (iii) Digital content (iv) Mode of lecture delivery (v) Technical infrastructure. The study concluded that students were most satisfied with higher education council and least satisfied with digital content and university management. Demuyakar (Demuyakar, 2020) uses an online survey to investigate the level of satisfaction of Ghanaian students studying online in higher educational institutions of Beijing, China. He concluded that internet connectivity is the major barrier for continuing education online either inside or outside China. Baber (Baber, 2020) investigated cross-country study for examining the factors for student satisfaction. According to the results of





study, the factors that positively affect student satisfaction include interaction in the classroom, student motivation, course structure, instructor knowledge, and facilitation. Chen et al. (Chen et al., 2020) analyzed online education platforms in China and uses questionnaires and web crawlers to forecast user satisfaction during COVID-19 pandemic. Their results revealed that platform availability has the greatest influence on user satisfaction. The aim of this study is to analyze the issues faced by students and teachers of Pakistan in implementing emergency online learning and teaching. Additionally, it focuses on measuring student satisfaction in online learning during COVID-19 and devised Content Quality (CQ), Content Availability (CA), Teacher Interaction (TI) and Mode of Lecture Delivery (MLD) as predictor variables.

3. Methodology.

The spread of COVID-19 has drastically reshaped the manner of imparting higher education across the world. Therefore, the higher education institutes started an untested mode of teaching and learning. Literature revealed that online learning is not a new concept but undoubtedly; exposed greatly in this pandemic and inherits its strengths and weaknesses. Hence, the purpose of this study is to determine the barriers that the students and teachers confronted in shifting from traditional face to face classes to online classes during the COVID-19 epidemic. In addition, this study aims at predicting the student's satisfaction from this new way of learning. Based upon literature, interaction is the key predictor in predicting student satisfaction in an online learning setting. The satisfaction predictors in most of the studies include three types of interaction (Means et al., 2020)(Y. C. Kuo et al., 2014). However, we have further divided these interactions and used Content Quality (CQ), Content Availability (CA), Teacher Interaction (TI) and Mode of Lecture Delivery (MLD) as the predictors of satisfaction. Henceforth, the study tends to answer following research questions: RQ1. What were the major barriers students encountered when switching to online learning during COVID-19? RQ2. To what extent do the four predictors (QC, AC, TI, and MLD) predict the student satisfaction? RQ3. What were the major challenges faced by teachers in conducting online classes?

3.1. Research Instruments.

As the study is aimed at analyzing the impact of COVID-19 on the education process therefore, two separate questionnaires were developed. First questionnaire deals with investigating the barriers and measuring satisfaction of students while the second questionnaire deals with analyzing issues from teacher's perspective during this pandemic. The student's questionnaire consists of 42 items which are arranged into four sections i.e. demographics, potential barriers, predictor variables and student satisfaction. Gender, age, department and university have been collected as demographic information. The potential barriers, specific to online learning, were measured via following four sub-scales: Resource Issue (RI), Home Environment (HE), Lack of Class Interaction (LCI) and Familiarity with LMS (FLMS). The items for measuring these barriers were crafted by keeping in view the possible problems that can be associated with students and collectively includes 16 questions. 14 questions were asked to quantify the satisfaction predictors. Though, the satisfaction scale includes 4 items to evaluate student satisfaction with their online learning in this pandemic.





The items for predictors and satisfaction were adapted from Kuo et al. (Y. C. Kuo et al., 2014) study after certain modifications. All scales were marked on a 5-point Likert scale type, ranging from 1 (strongly disagree) to 5 (strongly agree). Teacher’s questionnaire composed of 24 research items. Five of them were used for gathering demographic information (Gender, age, department, university and marital status) and 18 items were used to investigate the potential problems. The problems were categorized into technical issues, lack of student interaction, online content creation and home environment.

3.2. Participants.

The respondents of students’ survey were undergraduate students continuing their education through online classes after on campus classes were suspended. 1280 students participated in the survey who were pursuing their degrees in engineering, sciences, accountancy, pharmacy and business administration. The most representative group was sciences undergraduate students. The survey was conducted when almost every university started practicing online education and the questionnaire was available for 6 weeks. Teachers’ survey respondents include faculty members who were conducting online classes during the pandemic. Total of 112 members responded to the survey and all were new to online teaching as they have to shift to this new mode of teaching due to suspension of physical classes. They belonged to the field of science and engineering and most of them were married. The questionnaires were circulated via social media platforms as well as emailed to the faculty members.

Table 1. Descriptive statistics and reliability score for sub-scales of Student’s Questionnaire

	Items	Range	Mid-point	Mean	SD	α
Resource Issue	8	1-5	3	3.718	0.8285	0.889
Home Environment	4	1-5	3	3.197	1.22	0.961
Lack of class interaction	4	1-5	3	3.838	0.953	0.891
Familiarity with LMS	2	1-5	3	3.720	0.885	1.000
Content Quality	4	1-5	3	3.36	0.755	0.644
Content Availability	4	1-5	3	3.8	0.817	0.873
Teacher Interaction	6	1-5	3	3.6	0.736	0.798
Mode of Lecture Delivery	2	1-5	3	3.5154	1.070	1.000
Satisfaction	4	1-5	3	3.606	0.880	0.862





Table 2. Reliability score for sub scales of Teacher’s Questionnaire

	Items	Range	Mid-point	α
Technical Problems	6	1-5	3	0.819
Lack of interaction from students	4	1-5	3	0.680
Creating online content	4	1-5	3	0.825
Home Environment	4	1-5	3	0.917

4. Results and Discussion.

Data analysis was performed using SPSS 22.0. Descriptive analysis was conducted between predictor variables and student satisfaction. To understand the relationship of predictors and barriers, correlation analysis was performed. Regression analysis was executed to investigate the significance of the four predictors in student satisfaction prediction. Table 1 shows the descriptive statistics for each scale of student’s survey which includes mean, standard deviation (SD), number of items with their ranges, and Cronbach’s alpha. Among the four potential barriers, the highest mean score was observed for LCI with mean value of 3.838 and SD of 0.953 followed by FLMS and RI. The mean score of FLMS ($M = 3.720$, $SD = 0.885$) is slightly greater than RI ($M = 3.718$, $SD = 0.8285$) whereas HE got the least mean value of 3.197 with SD of 1.22. The highest means scorer among predictors was CA with mean value of 3.8 and SD of 0.817 while CQ becomes the lowest scorer with mean value of 3.36 and SD of 0.755 and the mean value of satisfaction is 3.606 with SD of 0.880. The Cronbach’s coefficient (α) was found to be acceptable for each sub-scale i.e. greater than 0.7. Investigation for outliers was conducted via Cook’s distance and no outliers were detected. Hence, no case was excluded from the analysis. The Cronbach’s alpha for all sub-scales for teacher’s survey form was also found to be acceptable as shown in Table 2.

4.1. RQ 1: What were the major barriers students encountered when switching to online learning during COVID-19?

In this research, we have identified unavailability of adequate resources, suitability of home environment, lack of class interaction and familiarity with university LMS as potential barriers in continuing education online. RI, HE, LCI, FLMS were used as subscales to measure these barriers.

Table 3. Correlations among Barriers in continuing education

	RI	HE	LCI	FLMS	Satisfaction
Resource_Issue	1				
Home_Environment	.473**	1			
Lack_of_Class_Interaction	.430**	.385**	1		
Familiarity_with_LMS	.094**	.006	.084**	1	
Satisfaction	-.032	-.062*	-.030	.224**	1

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





The results of correlation in Table 3 show that all barriers are positively correlated. However, their relation with satisfaction is negatively marked which proves clear hindrance in continuing the education online. The following subsections further describe the results.

4.1.1. Unavailability of Resources.

For Online learning number of resources are needed primarily, that include high speed internet connection, uninterrupted power and a computer. However, being an underdeveloped country, Pakistan is facing difficulties in providing equal facilities to all of its citizens. Therefore, these facilities turn out to be major barriers in online learning. As per statistics obtained from this study, 85.3% students faced difficulty in continuing online education due to electricity failure in their area while 89.8 % faced disruption in online classes due to internet connectivity issue. Moreover, around 70% of students were affected by using shared resources (laptop/ computer) to continue their education. Consequently, it is evident that internet connection becomes the major barrier in terms of resources for continuing online education in this pandemic as depicted in Fig. 1.

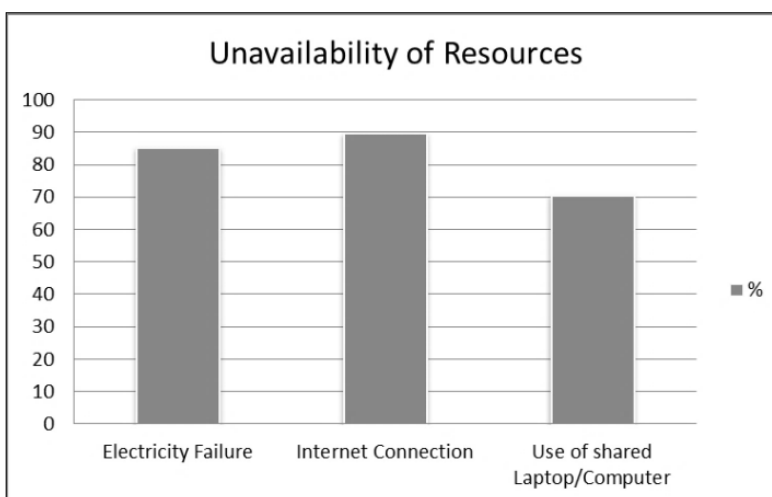


Fig. 1. Student’s responses in Percentage on Unavailability of Resources

4.1.2. Suitability of Home Environment.

To control spread of the pandemic, “Stay home stay safe” strategy turned out to be the only effective way for prevention (World Health Organization, 2020a). However, when all family members are at home, attending online classes become more difficult and there is a high probability of losing concentration during classes. Our study shows that 62.6% of the students did not have separate space for taking online classes. Moreover, 65.3% of the students have disruptive and least suitable home environment for online education.





4.1.3. Lack of Class Interaction.

Routman (Routman, 2005) postulates “students learn more when they are able to talk to one another and be actively involved”. However, online education serves as a barrier in learning process of students. Though, it is providing means for continuing the education in this pandemic but it inherits inadequacy. According to our survey, 82.4% students admit that they are not participating in their online classes as the way they do in traditional face-to-face classes. Learning is a social activity, universities in general, and physical class interaction in particular provides opportunities to learn not only from teachers but also from fellow students. Conversely, in online education during COVID-19, survey results revealed that 89.3% students are struggling with learning alone. Though, there are various platforms available online for collaboration but the students seem unenthusiastic to get acquainted with these platforms.

4.1.4. Familiarity with LMS.

Online education demands extraordinary IT infrastructure to minimize its inadequacies. Learning Management Systems has been around for decades and has been adopted by major universities in Pakistan since long. Most of the universities were using learning management systems at some level before the pandemic. Though, the LMS was being used for sharing resources and updates but students were at ease with their university LMS. Our survey results revealed that 91.4% students were familiar with their university LMS and hence this factor caused the minimal disruption in this emergency online learning. Fig. 2 depicts the proportion of each identified barrier in continuing education online. Resource issues and lack of class interaction found to be the most disturbing factor in the instant shift during COVID-19. However, the factor familiarity with LMS provides some ease to the students in carrying out online classes.

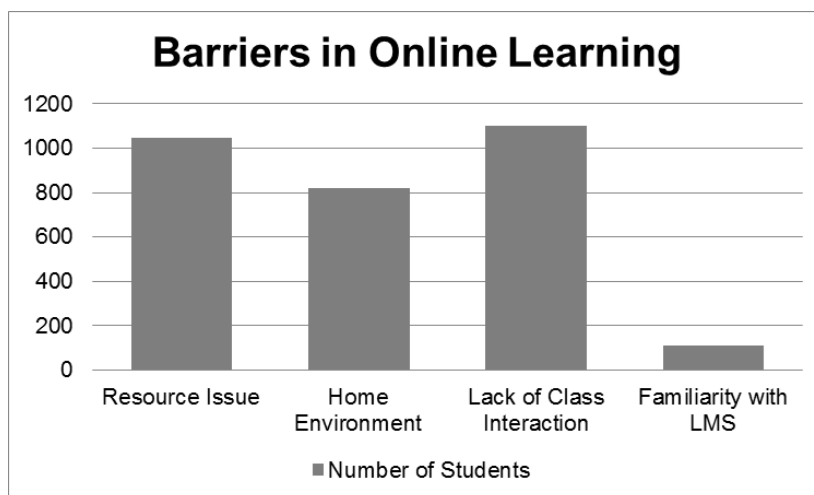


Fig. 2. Barriers to Online Learning with respect to Students.





4.2. RQ2: To what extent do the four predictors (QC, AC, TI and MLD) predict the student satisfaction in the instant shift towards online classes?

To determine whether the four predictors (QC, AC, TI, MLD) predict the satisfaction, Pearson correlation and standard multiple regression analysis was conducted. The correlation analysis indicates that all four predictors are positively correlated as shown in Table 4. The regression results initially revealed that all four predictors (QC, AC, TI, MLD) significantly predict the satisfaction with $R^2 = .842$, $R^{2adj} = .841$ and $F(4, 1274) = 1693.746$ at $p < 0.001$. Conclusively, this model accounts for 84.2% of the variance in satisfaction. Upon analyzing beta values, it was indicated that all four predictors significantly contributed (CQ, TI, MLS at $p < 0.001$, CA at $p < 0.05$) to the model. However, MLD is the strongest and most significant predictor while CQ is the least one as shown in Table 5.

Table 4. Correlation among dependent and independent variables

	CQ	CA	TI	MLD	Satisfaction
Quality_of_Content	1				
Availability_of_Content	.365**	1			
Teacher_Interaction	.315**	.456**	1		
Mode_of_Lecture_Delivery	.244**	.352**	.522**	1	
Satisfaction	.234**	.420**	.739**	.847**	1

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

Table 1. Co-efficient^a estimates of the model with four predictors

Model	Unstandardized Coefficients		Standardized Coefficients	t	p
	B	Std. Error	Beta		
(Constant)	.094	.061		1.536	.125
CQ	-.074	.014	-.063	-5.174	.000**
CA	.033	.014	.031	2.340	.019*
TI	.495	.017	.413	29.417	.000**
MLD	.526	.011	.636	48.026	.000**

^a = dependent variable: satisfaction; ** $p < .001$, * $p < .05$





4.3. RQ4: What were the major issues for teachers in carrying out online classes?

Teaching in online education requires specialized skill set and strategies to make it equivalent to the traditional face-to-face classes. “Distance education instructors must plan ahead, be highly organized, and communicate with learners in new ways” (Tobin & J, 2004). However, this abrupt shift to online teaching was a major change for teachers who were conducting physical classes since decades. Technology acceptance, learning new software, adjusting to the remote mode of teaching, and teaching from home are some of the critical issues in switching to online teaching that we have identified in this research. Keeping in view these challenges, Fig. 3 concludes the barriers; teachers encountered while providing online education. The successive sections further describe the results against each barrier.

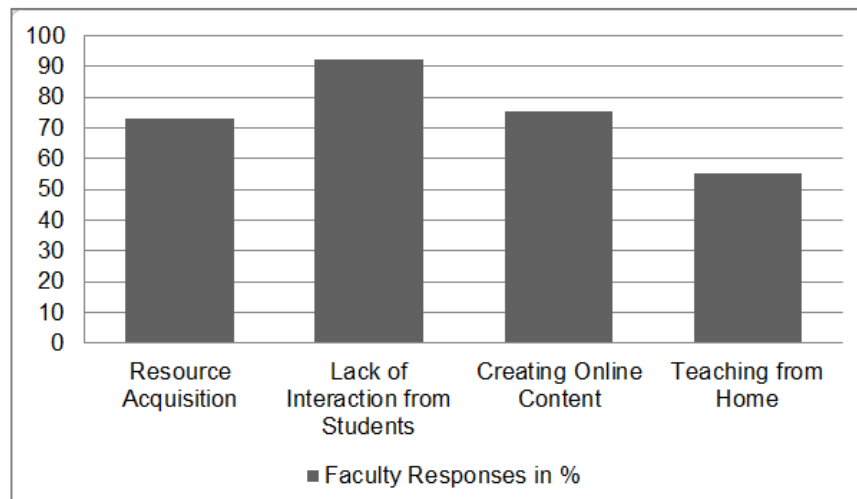


Fig. 3. Teachers’ Barriers to Online Learning.

4.1.5. Lack of Interaction from Students.

Online education can be carried out either using passive or active means (Hahn, n.d.). Passive techniques involve recorded lectures or reading texts while discussion forums, live sessions constitute to active approaches. Online education adopted in this pandemic is a combination of both techniques. Some teachers find ease at recording of lectures while some of them want to conduct live classes/sessions. According to our survey, 92% of the respondents validates that lack of interaction from students during live sessions demotivates teacher and hence affect the teaching process as depicted in Fig. 4.



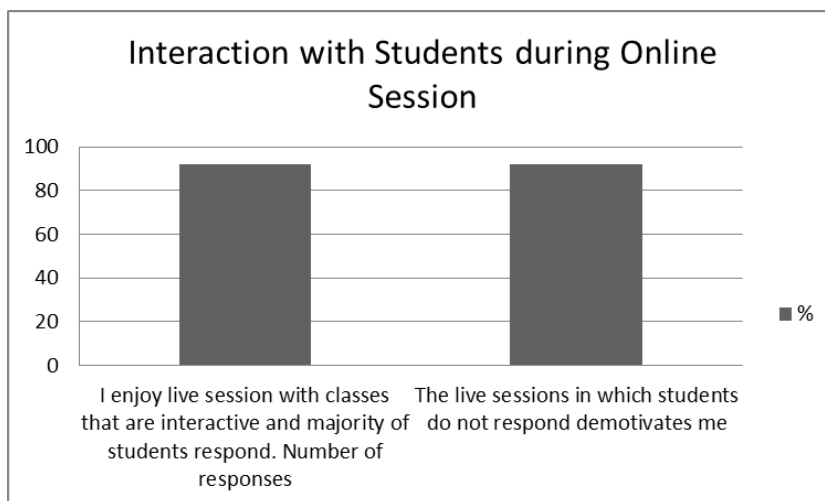


Fig. 4. Teacher Responses to Interaction with Students during Online Sessions.

4.1.6. Creating Online Content.

The time and effort required for creating distance education course content are considerably greater than that of traditional courses (Visser, 2000). This demands greater knowledge of teachers in terms of using suitable technology to produce such content. However, as classes were shifted in an emergency situation; the development of course content for effective online delivery could not be done. Therefore, the content optimized for physical classes was transformed into online content. The results have shown that 87.6% of the respondents admitted that creating online content is more challenging which may include recorded lectures, presentations, notes, assignments and examination papers. However, 63.5% feels learning of new technology has been an extra burden which requires more time and effort. One of the respondent mentions “Online teaching is way more time consuming”. However, many of them consider it as an only alternative to continue the education process in this pandemic.

4.1.7. Teaching from Home.

COVID-19 has significantly changed the way we are living our lives, working from home becomes the new norm during this pandemic (Zeidner, n.d.). Though, maintaining work-life balance in normal circumstances is itself a challenging task and achieving it in work from home environment makes it even harder. According to our survey results, 45.5% teachers agree that focusing on lecture preparation is more difficult at home as compared to their workplace. Moreover, 65.2% agreed that managing work and home chaos is more challenging leading to difficulties in adjusting online class timings.





5. Conclusion and Future Work.

Lockdown and indefinite closure of educational institutions due to COVID-19 paved the way for online learning as a substitute for the conventional education system. But, this switching from traditional classrooms environment to virtual spaces has been quite challenging for both students and teachers. This study aims to uncover the barriers students and teachers faced in this instant paradigm shift in learning and teaching. The study employed two distinct questionnaires to obtain both teacher's and student's perspective regarding online learning. The survey was carried out when online classes were in full swing in the majority of higher education institutions in Pakistan. The results showed that the lack of class interaction was the major point of concern for both students and teachers. Students were reluctant to interact in online sessions as they were less motivated and were unable to concentrate mainly due to insufficient resources at home. Lack of feedback from students created a major hurdle for teachers as they could not find out the level of student's understanding. The study further explored student satisfaction via four predictor variables (CQ, CA, TI, MLD) out of which MLD turned out to be the most significant. Consequently, student-teacher interaction is identified as a most significant factor for effective learning. Although, the pandemic has provided an alternative for continuing the education process, the setup adopted in a developing country requires many improvements such as technical training of teachers and resource fulfillment for students and teachers both. This study focused on determining the student satisfaction regarding course content and interaction with the teacher. However, there are many other open challenges in online education, such as, assessment methods, assessment quality, and maintaining transparency during assessments that can be explored further. We believe this study will help in improving the quality of online learning by minimizing the critical barriers identified in this study.

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