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Kalsoom B. Sumra, Muhammad Mumtaz, Nasra Dahir Mohamed & Abdul Haseeb. Educación online en medio de la crisis de COVID-19: problemas y desafíos en el nivel de educación

Educación online en medio de la crisis de COVID-19: problemas y desafíos en el nivel de educación superior en Pakistán

Online Education amid COVID-19 Crisis: Issues and Challenges at Higher Education Level in Pakistan

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RESUMEN.
El objetivo de este estudio es examinar las principales limitaciones experimentadas en el modo de educación online durante la pandemia en el nivel de educación superior en Pakistán. La pandemia de COVID-19 transformó el método de aprendizaje y enseñanza presencial a online. En una septicidad repentina inesperada, las universidades de Pakistán han comenzado la educación online sin formación adecuada y sin experiencia previa. Para ello, se recopilan datos de 750 estudiantes y de profesores de todas las regiones de Pakistán. El estudio ha utilizado el modelo de ecuaciones estructurales de mínimos cuadrados parciales (PLS-SEM). Los hallazgos muestran que los cuellos de botella tecnológicos, la preparación institucional y la brecha digital son desafíos importantes. Las diferencias en las percepciones de las áreas rurales y urbanas también son muy importantes en lo que respecta a las implicaciones de varias políticas, la implementación de tecnologías de la información y la comunicación (TIC), planes de estudio amigables, la mejora de la accesibilidad online y el desarrollo de infraestructura. Este estudio ayuda a las universidades a desarrollar políticas efectivas de e-learning para estudiantes durante la pandemia de COVID-19.

PALABRAS CLAVE.
Educación online, COVID-19, educación superior, brecha digital, tecnología.

ABSTRACT.
The objective of this study is to examine the main constraints experienced in the online mode of education during this pandemic at higher education level in Pakistan. The COVID-19 pandemic credibly transformed the method of learning and teaching from face to face to online. In unexpected sudden septicity, universities in Pakistan have started online education without proper instructional provision and relevant experience. For this purpose, the data is collected from 750 students and teachers across all over the regions in Pakistan. The study has used partial least square structural equation modeling (PLS-SEM). The findings show that technological bottlenecks, institutional preparedness, and digital divide are significant challenges. The differences in perceptions of rural and urban areas are also very important referring to several policies implications, implementing information communication technology (ICT), friendly curriculums, enhancing online accessibility and infrastructure development. This study contributes to help universities for developing effective e-learning policies for students in the situation of COVID-19.

KEY WORDS.
Online education, COVID-19, higher education, digital divide, technology.

1. Introduction.

The rapid spread of COVID-19 has shaken the whole world (Mumtaz, 2021). In the wake of the pandemic, education systems affected more than 1.5 billion learners worldwide (UNESCO, 2020). The pandemic has put pressure on educational institutes' closure worldwide (Giannini, 2020; Huang et al., 2020). The world education systems emerged with various resources for distance, remote and online instructions (Huang et al., 2020). The transition to online education has emerged with enormous challenges in lower- and middle-income countries (Joe et al., 2020; David et al., 2020; Niyigena et al. 2020). Moving to an online system was necessary after the outbreak of COVID-19, with the primary concern of global education move (Carey, 2020). Thus, many developing and under-developing countries do not have all resource and capacities to implement an online system. Some other developing countries have a problem with electricity availability or a few hours (Shahabudin, 2020). To transfer the education system into the online mood, the availability and accessibility of the internet must participate in digital learning (Zhong, 2020). Also, academic institutions' affordability and adoption of information communication technology (ICT) are another challenge in Pakistan (Abbas et al., 2017; Muhammad Adnan& Kainat Anwar, 2020).

Same in the sprint, Pakistan also responded immediately for online facilitation to impart education remotely. Higher education institutions announced their intent to impart online education quickly with challenging circumstances (Yousafzai, 2020). In unexpected sudden septicity, universities have started online education without proper instructional provision and

relevant experience. Moreover, online education in Pakistan is still in its infancy stage, not integrated with the higher education system's regular mainstream stem (Ameen et al.,2020). Geographically, Pakistan is strewn in extreme inequality, poverty and economic vulnerability projected to worsen in such a pandemic (Yousafzai, 2020; Nasir, 2020; Silvia, 2019). It directs the variation in access and deprivation of technology and bandwidth internet in various regions and remote areas (Digital Rights Foundation, 2020). Notably, regions of Baluchistan, Khyber Pakhtunkhwa, and Gilgit-Baltistan have inadequate Internet coverage (Malik, 2020). Recent studies have shown the challenges of online education in developing nations like Pakistan (Mailizar et al., 2020; Basilaia & Kvavadze, 2020; Muhammad Adnan& Kainat Anwa, 2020). The current assessment of online classes is necessary to make it productive if the pandemic goes longer. This study is aimed at internalizing the key constraints experienced in online mode of education during this pandemic. These challenges are also backed by evidence from students and faculty involved in online classes at the higher education level.

2. Theoretical background and Hypothesis development.
The online educations system has several challenges like the availability of online resources, accessibility of the internet, quality of the curriculum, interpersonal interaction (Jones, 2015; Reamer, 2013; Pelech et al., 2013). This indicates the theoretical underpinnings closer to networking cooperation, resources based and technological (Adedoyin & Soykan, 2020; David et al., 2020; Gordon, 2014). After governments implemented urgent lockdown policies, the rapid move to online education was a little time for higher education institutions to plan an effective online education system, and this was another challenge (Rebecca, 2020). While in Pakistan, certain provinces have a problem with internet services (Malik, 2020). Transitioning from traditional forms of face-to-face to online interaction is highly complex for the education system, even in the finest circumstances (World Bank, 2020a; Singh & Thurman, 2019).

2.1. Technology Bottlenecks.
Advances in information technology is considered a powerful driver in contemporary higher educational settings. Technologies advances in online education refer to communication devices, resources, electronic tools to facilitate e-learning or distance learning. When it comes to online education, a transition to e-learning in higher education brings new requirements in digital innovation (Singh & Thurman, 2019). Smart devices and intelligent technologies can be as superlative tool for accessing e-learning (Huang et al., 2020). These technological devices improve the performance of online sources. Higher education institutes' interest in using innovative technologies breached access to remote and e-learning (Gordon, 2014; Ozdemir & Bonk, 2017). A range of factors contributes to the recent urgency and need for online learning provision. Despite these possible technological developments, there is limited provision to adopt information and communication technology (ICT) during crises such as COVID-19 (Najib & Ranjan, 2020; Harris 2020; Anderson, 2020; Turner Lee, 2020). Various studies have been conducted to examine the critical issues affecting online education, such as communication devices and online platforms under crisis (Davis et al., 2013; Jeladze et al., 2018; World Bank, 2020; UNESCO, 2020a; UNESCO. 2020b; Paul, K. 2020). The universities' information management system creates hurdles, not connecting directly with

online classes' sources in developing countries. The prior online communication mechanism in universities can offer the experience of shared workspaces. It can cope with a certain capacity to deliver online education to a large number of students. When implemented correctly, the online communication mechanism between students and teachers in the classroom, develop quickly digital skills in distance learning (ASCD. 2020; UNESCO, 2020c). From all the above discussion, the following hypotheses are assumed.

Hypothesis 1: Easy Access to digital resources is big challenging for Online education.
Hypothesis 2: Harnessing educational technology has an indirect impact on availability for institutional preparedness to support online education.

2.2. Institutional Preparedness.

The COVID-19 pandemic has abruptly prompted institutes and universities to start remote/online education without having relevant experience and preparation. This has exposed the vulnerabilities not only at the school level but also for higher education worldwide. This pandemic has shown the need for resilient online education systems to handle such crisis (World Bank, 2020a; Huang et al., 2020). Some institutions, especially those in remote areas with a conventional education system, face formidable challenges in developing countries. The institutes and universities embracing web-based information management systems are also encountering enormous issues (Rasheed et al., 2020). Lack of preparedness and institutional readiness for online education is obvious in online and other related multitude issues with organizations (McAleavy et al., 2018; Casey & Wilson, 2005). This back and forth between institutional readiness and educational technology refers to web-based information, e-learning plans, and technical support system (McAleavy & Gorgen, 2020; Kumar et al., 2012; Raji & Zualkernan, 2016; Huang et al., 2020).

With similar outcry in Pakistan, the sudden shift to online classes raised the requirement for faculty to move courses into the online environment (Qureshi et al., 2012). This highlights the low quality of instruction and poor support of institutions. Abruptly a lot of challenges emerged with pedagogy issues for remote teaching (Burge et al., 2012). Many universities never get exposed students for handling hardware and software for online access system. Technological advances often prepare the institutes' capacity to be enhanced for online education systems (Ozdemir & Bonk, 2017; Petrina, 2011; Ackerman, 2013). Providing sufficient digital training is the primary hurdle in delivering online education (Petrina, 2011). Information management systems, assessment tools and remote tools need planning and thoughtful design for online education. Looking into the above discussion, the following hypotheses are derived.

Hypothesis 3. Institution or Universities' information infrastructure is creating the issue and a big challenge for online classes
Hypothesis 4: Lack of support and training have an indirect impact on academic integrity in online education

2.3. Digital Divide.

Under COVID-19, the terminology digital divide has elucidated the gap in access and usage of internet devices (Trucano, 2020; Jalli, 2020). The pandemic has brought precarious access

to information and communication technology (David et al., 2020; Fifield 2020; Kohli & Blume 2020; Huang et al., 2020). It has tinted much worse digital divide challenge globally and in developing countries the most (USAID, 2020; Burns, 2020a; Trucano, 2020; Education Endowment Foundation, 2020; Bunyan & Collins, 2013; D. Riddlesden & Singleton, 2014). For remote and online education, digital divide has more pronounced disruption in higher education in Pakistan. With leading statistics, only 35 per cent of the population has access of internet in Pakistan (Global Digital Report, 2019). Although the penetration of smartphones is massive in Pakistan, but the usage of information and communication technologies is much lower. The spread of internet across the country is 35%, with 78 million broadband connections and 76 million mobile internets of 3G/4G expansion (Inclusive Internet Index, 2020).

At worst, internet access is grappling with the challenges for remote area students (Jalli, 2020; Niyigena et al., 2020; David et al., 2020). This pandemic has shed light on the digital divide, causing more inequality in Pakistan. On the other hand, this crisis has brought the necessity of connectedness quality in underdeveloped regions (Huang et al., 2020). The shortage and limited connectivity announced the holistic education challenge for remote regions (World Bank, 2020b). This has deprived many students to access teacher sharing platforms and material. The pandemic disruption is also causing pressure on broadband speed. Many students are not able to afford broadband internet due to social reasons. Additionally, mobile internet speed has been also not fast enough in some under coverage areas (Huang et al., 2020; World Bank, 2020b). Even students with access to the internet skill are facing challenges with digital infrastructural divide (Park, 2009; Raja, 2016; Nishat & Michael, 2019; UNESCAP, 2020).

The worst situation of internet access is in conflicting and remote parts of the country where the internet is banned due to some security challenges. Even internet speed is significantly lower in remote areas than in urban centres. The average speed of internet is 8.51 Mbps in Pakistan (Speedtest Global Index, 2020). Various telecommunication providers are also not covering services in some of the areas in Pakistan. Being deprived from digital facilities, online education is simply not possible for many students without internet access (Oberiri & Timothy, 2018; Fasae & Adegbilero-Iwari, 2015; Emeka & Nyeche, 2016; Nwezeh, 2010). Since online classes are linked with internet and updated information technology, so security issues are correlated with it as a threat (Huang et al, 2020; Petrina, 2011). This discussion leads to the following hypothesis.

Hypothesis 5: Digital Divide and disparity are causing disruption in online education.

2.4. Time Management.

Transition to online education is new in many countries under COVID-19, pushing demanding time frame. While adjusting full-time online classes, it is challenging to manage time effectively in such critical conditions. Time management is very important for online education and meeting deadlines for target learning is crucial (Mayes et al. 2011; Singh & Thurman, 2019). Teaching in online classes demands sufficient time for successful course design and planning (Jacobs, 2014; Lee & McLoughlin, 2010). Time management also needs self-motivation on the part of students and teachers from transition to online education. In addition to course

preparation and teaching materials, several efforts are required to develop assessment modes for technical courses (Qureshi et al., 2012).

The need of online education in amid COVID-19 encourages educators and learners to positively manage the time effectively (Huang et al., 2020). Lack of familiarity and experience with online education and learners' readiness is also a critical challenge to manage time (Allen, 2007). In Pakistan society with many distractions, educators, and learners at home; they have to complete full load of courses and hours of studying. Multitasking, planning, adapting to digital tools are much time consuming for online education, and need proper time management (Gordon, 2014; Goode et al., 2007). Along with more societal issues in Pakistan, the disparity and digital divide are the primary hurdles in time management. Flexibility is the vital requirement for time management in online education (Parker, 2003; Warburton, 2009). New time management skills are required while transitioning to online education (Wagner et al. 2014; Zheng et al. 2016). This discussion assumes the following hypothesis.

Hypothesis 6: Most educators and learners are experiencing time management issues in transitioning to online education.

2.5. Academic Integrity.

Because of COVID-19, the adaptation to online education is creating questions for academic integrity (Hundred, 2020; Huang et al., 2020; UNESCO, 2020). In traditional face to face education system is designed on credible evaluation and planning. Transition to online education has familiarized educators and learners with different assessment tools (Huang et al., 2013; Qureshi et al., 2012; Singh & Thurman, 2019). These tools are infantile for most institutes and universities (Burge et al., 2012). For long duration of courses, the assessment is not much productive via online systems (Huahong et al., 2020; INEE. 2020a INEE. 2020b; Ferdinand, 2020). Instructors lacking skills and experience with online teaching face trouble with online assessments such as quizzes (Allen, 2007; Petrina, 2011). Students are also confused and frustrated as they have never gone through online classes. Transitioning to remote learning, educators around the world are encountering numerous concerns for academic integrity.

In Pakistan, the new experience with online education is creating confusion for academic integrity. It requires a lot of proper planning and designing assessments. Due to lack of sufficient bandwidth and internet access, the instrument tools are not sufficient to be grabbed with various courses assessment requirements (Smith & Noviello, 2012). Another challenge is the question of privacy and security issues amid COVID-19 for online education. Misuse of technology is common worldwide, and data privacy issues are more critical in Pakistan. Keeping in view the above discussion, the following hypotheses are derived.

Hypothesis 7: Online tools are not sufficient to be suitable for academic integrity for online education.

Hypothesis 8: Blended learning and adaptability are immediate challenges in academic integrity for time management and have an indirect impact on online education.

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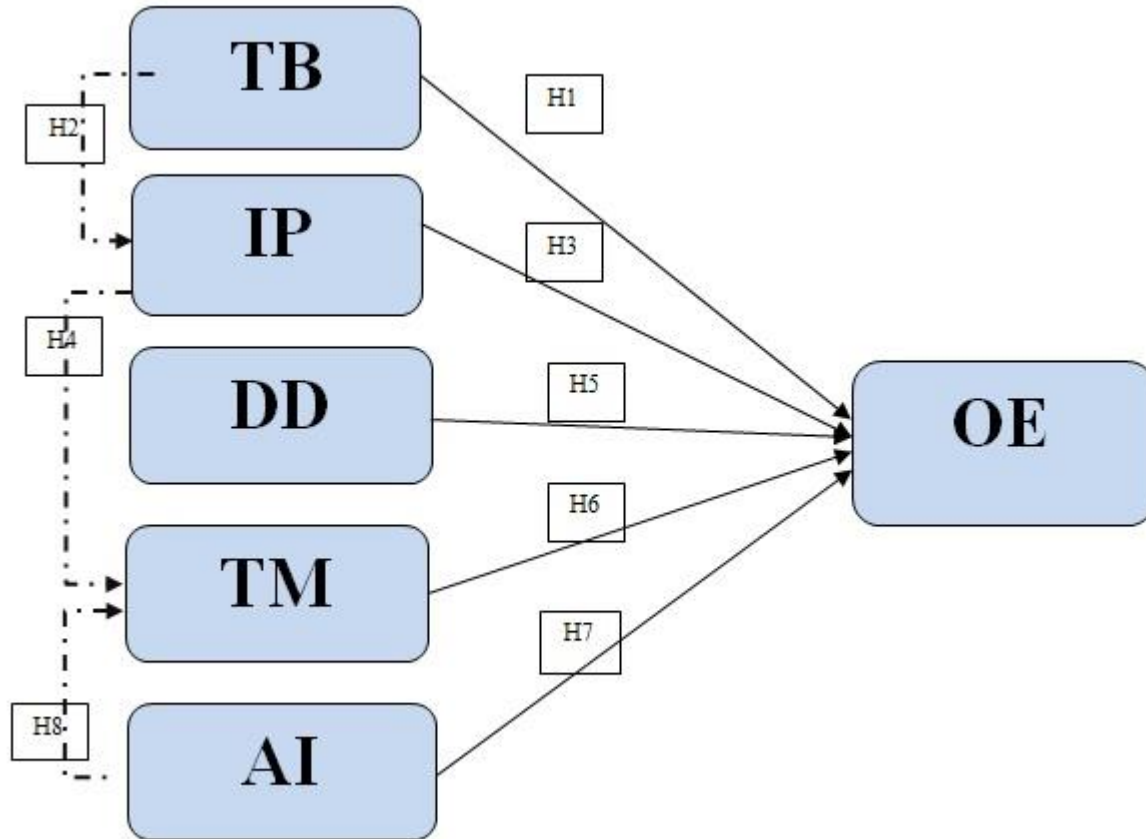
Fig. 1 Proposed Framework

Figure 1 shows the proposed framework. Where TB denotes Technological bottlenecks; IP shows Institutional preparedness; DD is the Digital divide; TM represents Time Management; AI shows Academic integrity, and OE denotes online education

3. Method.
3.1. Study Context.
Pakistan is a developing nation in South Asia region, having approximately 50 million students' enrollments are at risk due to COVID-19 (Malik, 2020). During first wave of COVID-19, hundreds of students in remote areas like Azaad Jammu Kashmir, Gilgit-Baltistan, and the tribal areas of Khyber Pakhtunkhwa could not access online classes or travel along miles to get internet. Hence, various regions are experiencing problems in accessibility of internet, electricity, and aligned problems, and there is a low-level preparedness among the students (Kumar et al., 2012; Mahnoor, 2020). In Pakistan, remote communities face daunting challenges in accessing technological resources. In this pandemic, mobile phones help to access online material in some distant areas of Pakistan. While access to devices is not necessarily important, this technology's harness is important in developing countries scenario

(Niyigena et al. 2020; Kumar et al., 2012). Another hurdle of technological reliance is to make the best use of educational resources. When technology in a thoughtful way is accessible, connected, and useable to meet particular problems, it can potentially transform online and distance education systems.

3.2. Procedure.
An online survey is used through google forms to assess online education challenges during COVID-19 at the higher education level in Pakistan. The study used a five scale from fully to very rare and used multiple items to measure each construct. To measure, the research also adopted existing measurement scales. The scale also assessed the online education challenges that students and teachers face during COVID-19. Constructs are modified accordingly. This study adopted six constructs and under each construct, there are four items, so total of twenty-four items are adopted. The use of a multi-level approach is suitable to collect data from teachers and students. The study measured technological bottlenecks (TB-four items) adopted from Jeladze et al., (2018), World Bank, (2020), Paul, K. (2020); Institutional preparedness (IP-four items) from Huang et al., (2020), World Bank, (2020); Digital Divide (DD-four items) from (Niyigena et al., (2020), Jalli, (2020), Raja, (2016); time management (TM-four items) from Huang et al., (2020), Zheng et al., (2016); Academic integrity (AI-four items) from (Ferdinand, 2020; Hundred, 2020) and online education (OE-four items) taken from Huang et al., (2020), Ferdinand, (2020). There are two pre-tested surveys collected from four teachers and from four students to measure the respondents understanding and interpretation of the survey questions.

3.3. Participants.
The data is gathered from different cities of Pakistan. Its first wave of COVID-19 started in May – October 2020. Since the classes are online and the system of teaching and learning online is a new challenge to both the teachers, students, and academic institutions (Mailizar et al., 2020). This research adopted purposive sampling, and the data is collected from different target groups in all regions of Pakistan. Students who are studying in the pandemic period and institutions facilitating education during the lockdown, and after lockdown which still classes are semi online. To choose the suitable target groups, this study selected a sample of 450 students and 300 teachers since the general sample of this survey was 750. Mutually teacher and students were invited to participate in the online survey. As the research ethics mandated, the identity of the participants is being protected. And after six months of data collection, the numbers of final responses were 750. After data collection, the responses were screened to avoid any mistakes during the data analysis. The analysis showed that the data collected in all provinces of Pakistan was equally distributed.

3.4. Data analysis.
Partial least squares structural equation modeling (PLS-SEM) involves the specification of the inner and outer models. This model is used when data is not distributed in the normal range (Hair et al., 2013). Since this study is examining the relationships between constructs, PLS-PM is suitable for complex models. Descriptive statistics in table 1 shows the profiles of the

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respondents. It indicates from the combined sample 64% are females and 36% male. 31% of the participants are between 18-25 years old and 26% are between 36-45 years old. The participants are from the following academic branches; management science (34.4%), engineering and information technology (18%), social sciences and humanities (26.5%) and natural and life sciences (21%). They are mostly from the undergraduate level of teaching and learning. Most of the respondents are from urban locality.

Table # 1.
Respondents Profile.

	Combined sample (750) %	Students sample (450) %	Teachers sample (300) %
Age			
18-25	31	59	3
26-35	22	27	17
36-45	26	12	40
Above 46	21	2	40
Gender			
Male	36	40	30
Female	64	60	70
Academic branch			
Management sciences	34.4	34	35
Engineering & information technology	18	16	20
Social sciences and humanities	26.5	28	25
Natural and life sciences	21	22	20
Classes level			
Undergraduate	55.5	56	55
Master/M.Phil	35.5	36	35
Ph.D	9	8	10
Locality			
Urban	67.5	71	64
Rural	32.5	29	36

4. Results.
4.1. Measurement Model.
The reliability and convergent validity are measured on factor loadings, constructs Average variance extracted (AVE) values, composite reliability and Cronbach alpha (Haier et al., 2017). The factor loadings of all indicators are higher than 0.7. The AVE values (table 2) are higher than 0.5 in both samples. Table 2 shows that Most of the Cronbach alpha measurement value

is higher than 0.7 and composite reliability is more than the threshold of 0.7 in both samples. Fornell-Larcker criteria are used to assess discriminant validity and constructs indicate more variance within items. The cross-loadings of each construct is higher than its items. The variance inflation factor (VIF) is used to assess collinearity, and VIF values are low than 5. It indicates the VIF values for multicollinearity.

Table # 2

Assessment of reliability and validity

Constructs	Stud & Teach			Students			Teachers		
	CR	AVE	Cronbach alpha	CR	AVE	Cronbach alpha	CR	AVE	Cronbach alpha
TB	0.90	0.65	0.86	0.91	0.69	0.89	0.93	0.82	0.89
IP	0.90	0.76	0.84	0.84	0.64	0.72	0.93	0.88	0.87
DD	0.91	0.72	0.87	0.86	0.68	0.77	0.88	0.72	0.80
AI	0.88	0.72	0.80	0.84	0.63	0.71	0.91	0.79	0.86
TM	0.88	0.71	0.80	0.91	0.84	0.82	0.93	0.87	0.86
OE	0.78	0.87	0.69	0.91	0.84	0.81	0.90	0.75	0.83

4.2. Hypothesis testing.

To test the hypothesis, the relationships of constructs are assessed via bootstrapping procedure estimating path coefficients (Haier et al., 2014). Table 3 presents the results in all three models which indicate the relationship of technological bottlenecks (p values = 0.00), institutional preparedness (p values = 0.00), digital divide (p values = 0.00) and time management (p values = 0.00) with online education confirming H1, H3, H5 and H6. The relationship of technological bottlenecks with institutional preparedness (p values = 0.00) and IP with academic integrity (p values = 0.00) are confirmed in all models supporting H2 and H4. The relationship of academic integrity with online education (p values = 0.00) and time management (p values = 0.00) is supported in the combined group model and teachers group model but not supported in students' sample. So, H7 and H8 are partially supported. The R^2 values of IP, AI, TM and OE indicated predictive relevance of the dependent variables. The explanatory power in teachers' sample is highest.

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Table # 3.
Hypothesis Testing.

Relationship	Students and Teachers			Students			Teachers		
	t-statistics (|O/STDEV|)	p-value	Hypothesis	t-statistics (|O/STDEV|)	p-value	Hypothesis	t-statistics (|O/STDEV|)	p-value	Hypothesis
TB -> OE	4.50	0.00	H1 supported	4.36	0.00	H1 supported	3.74	0.00	H1 supported
TB -> IP	2.88	0.00	H2 supported	2.34	0.02	H2 supported	2.465	0.01	H2 supported
IP -> OE	8.65	0.00	H3 supported	2.27	0.02	H3 supported	3.25	0.00	H3 supported
IP -> AI	2.34	0.02	H4 supported	3.94	0.00	H4 supported	3.84	0.00	H4 supported
DD -> OE	9.68	0.00	H5 supported	3.84	0.00	H5 supported	3.94	0.00	H5 supported
TM -> OE	3.21	0.00	H6 supported	3.66	0.00	H6 supported	5.19	0.00	H6 supported
AI -> OE	3.90	0.00	H7 supported	1.59	0.11	H7 not supported	3.21	0.00	H7 supported
AI -> TM	2.67	0.00	H8 supported	1.10	0.26	H8 not supported	2.57	0.01	H8 supported

4.3. PLS-MGA.

This study used partial least squares multi-group analysis (PLS-MGA) to test the survey's direct and indirect relationship. Technological bottlenecks, institutional preparedness, digital divide, academic integrity and time management have a significant positive impact on online education. The proposed model shows the indirect influences. PLS-MGA compares multi groups (Henseler & Ringle, 2011), in this case, students and faculties by using bootstrap assessment sample. The PLS-MGA analysis in table 4 validated the variations in path value impact, for in H1 (TB->OE), there is a significant impact among students and faculties. In table 4, supporting path coefficients of three samples in this study are summarized.

Table # 4
Hypotheses testing in cross samples from rural and urban

Relationship	Hypotheses	Rural vs. Urban		Students vs. Teachers (Urban sample)		Students vs. Teachers (Rural sample)	
		path coeffi-diff	p-values	path coeffi-diff	p-values	path coeffi-diff	p-values
TB->OE	H1	0.143	0.011	0.145	0.998	0.001	0.507
TB->IP	H2	0.098	0.025	0.151	0.952	0.047	0.868
IP->OE	H3	0.341	0.330	0.780	0.999	0.439	0.000
IP->AI	H4	0.154	0.998	0.115	0.991	0.269	0.999
DD->OE	H5	0.387	0.072	0.351	0.330	0.082	0.055
TM->OE	H6	0.081	0.948	0.049	0.091	0.032	0.252
AI->OE	H7	0.085	0.098	0.266	0.000	0.351	1.000
AI->TM	H8	0.012	0.572	0.172	0.039	0.160	0.950

4. Discussion and policy implications.

Several studies have shown that developing nations lack online learning and teaching components such as the internet, electricity, computer, and skills is a dilemma (Abdon et al, 2007; Aczel et al.,2008; Berman, 2008). Moreover, many situational, attitudinal, psychological challenges with COVID-19 were being confronted in online education. In this study we found the same results which are in compliance with the existing literature to some extent.

This study's entire hypothesizes from students' perspective have been supported except H7 and H8 among the students. There is a relationship between institutional preparedness and academic integrity, digital divide and online education. Most of the students responded that there is no impact among the academic integrity and online education. Furthermore, students also answer that there is no connection between academic integrity and time management.

From faculties side, All hypothesis has been supported among teachers, showing significant relationship. Yet, the most potential technological bottlenecks are little understanding of hardware and software tools by the students and teachers (David et al., 2020; Anderson 2020). Limited access to multiple resources in supporting teaching and learning assessment is disrupted region wise in developing countries (Najib & Ranjan, 2020; Kumar et al., 2012; Moore & Marshall, 2020). Online learning resources are another challenge in contrast to face-to-face learning. Support for specific technologies for online and distance education is the major technological bottlenecks. Assistive technologies, according to requirements of students are the potential significance. Hence, after the pandemic outbreak, governments across the world introduced immediate lockdown policies, which lead to the educational institutions developing a new approach of teaching and learning based online (Adedoyin eta l., 2020). Yet, there are challenges in online education, particularly in developing nations such as logistical challenges, pandemic anxiety, internet availability mainly in remote areas, and availability of learning equipment. Moreover, Students feel that, despite online education problems, there are technical problems, and difficulties in understanding instructional goals are other barriers. (Song et al., 2004). These are the challenges both students and teachers face during this lockdown and after the lockdown during mixed classes both online and offline (Yousafzai, 2020).

Higher education institutes need to adjust the teaching system, develop new online curriculums, and teach online. Higher education institutions around the global north are being tested to modify strategies for urgent transition in online tools for distance learning during COVID-19 outbreak. New policies regarding electricity infrastructure in developing nations could enhance the availability of high connectivity internet by enhancing electrical technology development. To improve online education and transmute an advanced learning system, creating reliable live streaming via web conferencing or later is e-boards, discussion forums, material files, feedback, and various links on institutional management systems (Littlefield, 2018; Huang et al., 2020).

The technology bottlenecks are often seen primarily hurdle to overcome in online and remote learning. Many empirical studies endorsed the technological challenges in online or distance education in developing nations (Limperos, et al., 2015; Mayes et al., 2011; Ackerman, 2013). To facilitate quality education, ministries of education should subsidize the schools to get a new computer and train new teachers who can teach online education.

Since the globalization of education is new system, a new policy to deal with is necessary. Online education also needs intellectual property protection. To secure online education's academic integrity and avoid plagiarism and cheating stick policies regarding writing and academic actives are necessary. The students engaging in quality education thought online learning, mainly in the higher education time management, and designing short classes are vital. To avoid the confusion and make classes more interesting, this research recommends having an education policy consider the identified challenges.

Furthermore, the study suggested disseminating quality education in online mood, policy makers, and curriculum developers to develop ICT friendly curriculum and courses appropriate in developing countries even after the COVID-19 pandemic. Implementing an effective digital-based learning system requires well-built infrastructure and well-trained teachers in terms of technology (Sife et al., 2007).

5. Conclusion.

After the outbreak of COVID-19, online education has become a prevalent system of teaching and learnings. During the lockdown across the world, it was compulsory to close all universities, schools and the education sectors to control the pandemic's spread. Yet, there are many challenges to higher education institutions to implement or develop a new teaching method. There are several challenges in online education at the time of COVID-19 and multiple factors are affecting online education, especially at higher studies level. Major contributing factors effecting online education includes technological bottlenecks, institutional preparedness, digital divide, time management, and academic integrity. Technology availability, institutional preparedness, and time management are major key factors for online education from both students and faculties' perspectives. However, academic integrity and digital divide are not much influencing factors towards effective online learning. There is a need to introduce online policies by Pakistani educational institutions so as to effectively adapt with the new mode of online learning. This study is limited to the case of Pakistan and educational intuitions in different cities. There is need to conduct the same kind of studies especially in rural educational institutions of Pakistan. Moreover, these hypotheses are needed to test in other countries especially in developing countries context.

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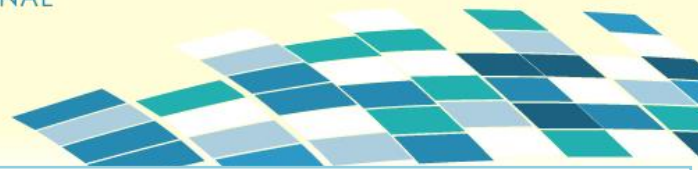
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