Article:	**Shifting Paradigm in the Higher Education Sector of Pakistan during COVID-19: An Empirical Analysis of the Online Teaching Experience**
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Online Pub:	Summer 2021
Article DOI:	https://doi.org/10.29145/eer/41/05
Article History:	Received: September 21, 2020 Revised: February 15, 2021 Accepted: June 1, 2021
Citation:	Lodhi, S., Iqbal, Z., & Ayyubi, M. (2021). Shifting paradigm in the higher education sector of Pakistan during COVID-19: An empirical analysis of the online teaching experience. *Empirical Economic Review, 4*(1), 116–136. Crossref
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Shifting Paradigm in the Higher Education Sector of Pakistan during COVID-19: An Empirical Analysis of the Online Teaching Experience

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Abstract

The world is undergoing a dramatic COVID-19 induced transformation in almost every sector of the economy including education. The virus has drastically changed the dynamics of teaching and learning across the globe. This paper is an attempt to examine how COVID-19 has affected the higher education sector of Pakistan. An empirical analysis of the online teaching experience of both the public and private sector university faculty was conducted for this purpose. The current study aims to highlight the need for developing tools for effective teaching that have wide ranging applications in Pakistan, an exercise that requires concerted research effort. Education sector is among the worst hit sectors due to the spread of the coronavirus in Pakistan. Indeed, educational indicators for Pakistan and the current state of the education sector indicate a gloomy scenario. Instructors and students across universities, colleges and schools were ill-prepared for a situation where they had to rely on online teaching and other web-based instructional tools. In this scenario, certain areas in the education sector require extensive research, training and application, such as digital education, assessment tools and applications, project-based learning (PBL), and mobile based strategies for developing self-regulated learners (SLRs) as well as the introduction of various other tools meant to enhance student engagement during the process of learning. The study found that the faculty in the public and private sector universities was not inclined towards online teaching. The results also revealed that the private sector institutions were more facilitating than the public sector institutes. However, the role of HEC during the pandemic was proactive. There is a need to take effective measures at the local and national level to facilitate the

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student body as well as the instructors lest there is a severe decline in educational indicators or rise in the dropout rate.

Introduction

The COVID-19 epidemic began in Wuhan, China and quickly developed into a pandemic with dire consequences for the entire world. Due to this pandemic, an economic crisis has erupted all over the world. Stock markets saw the worst crash since the 1987 Black Monday (Roy et al., 2020). Many businesses were forced to close due to low demand during the lockdown, while others are still struggling to survive. Exports have dropped worldwide. Laborers and employees are being laid off. In such difficult conditions, developing countries like Pakistan face the additional burden of providing income support to the poor households and struggling businesses that were adversely affected by COVID-19 using government funds.

The coronavirus or the COVID-19 has affected 56,44,673 people worldwide and caused the deaths of 3,278,437 people till May 8th, 2021 as reported by Worldometers. The virus is zoonotic and it originated in China (Haleem, 2020). Despite China gaining control over the outbreak, the country has not yet recovered fully nor regained its prior production volume. The countries worst affected by the pandemic also have some of the largest economies across the Atlantic, such as USA, Brazil, UK, Spain, Italy, France and Germany. The virus has drastically influenced the day to day activities including social, political, educational and economic activities across various regions and territories (WHO, Corona virus-126th situation report). The situation has been aggravated with adverse shocks on both the demand and supply sides of the economy which is likely to turn into a "supply chain contagion". This is because of the fact that the world's most important economies that have been affected by the virus are also a part of the global value chain. These economies collectively constitute nearly two-third of the global manufacturing potential and more than 40% of the global trade of manufactured goods (Baldwin & Di Mauro, 2020). It

implies that when these economies are affected, the rest of the world is also affected in a number of ways.

While this paper was being written, there had been 850,131 confirmed cases of COVID-19 in Pakistan with more than 18,677 deaths, as per the Government of Pakistan COVID-19 Statistical website. According to the initial figures given by the National Disaster Management Authority, almost 1,000 beds were available in the quarantine centers and 2,500 were available in the isolation wards throughout the country. Thirty-five tertiary health care hospitals were initially designated for treating the coronavirus patients. The healthcare facility available portrays a grim picture when seen in the context of the number of COVID-19 positive cases in the country. Currently, patients are finding it difficult to have ventilators in the hospitals. The lack of strict price control and anti-hoarding campaigns has led to a shortage and an extreme price hike of life saving drugs and injections. The government is unable to manage this calamity due to an extremely slow pace of vaccination and utterly insufficient procurement of the available vaccines.
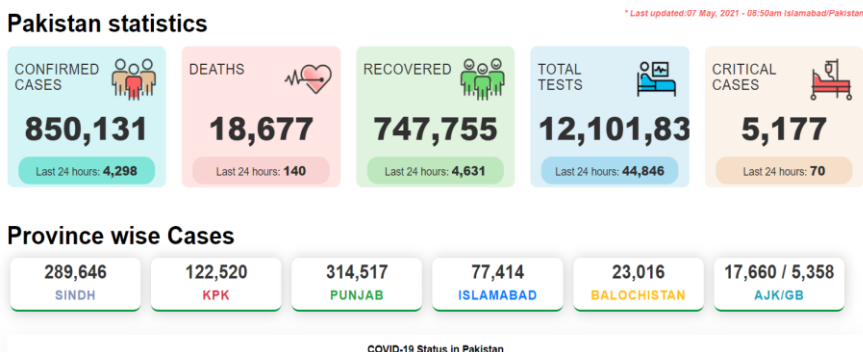
Severe acute respiratory syndrome (SARS) is also a viral respiratory disease caused by a SARS-associated coronavirus. It was first identified at the end of February 2003 during an outbreak that emerged in China and spread to four other countries. According to WHO, it was the first severe and readily transmissible new disease to emerge in the 21st century and it showed a clear capacity to spread along the routes of the international air travel. Generally speaking, COVID-19 takes more than fifteen days for incubation, though its new variants take lesser time. Although SARS also caused fatalities, the COVID-19 virus spread across the globe and has a higher transmission rate as compared to SARS.

The statistics in figure 1 represent the COVID-19 situation in Pakistan as of May 8th, 2021.

Figure 2 illustrates the global distribution of COVID-19 cases per thousand lives. Pakistan is highlighted as a country where at least one case was reported per thousand lives across the country and 1-3 cases per thousand lives were reported in the province of Sindh.
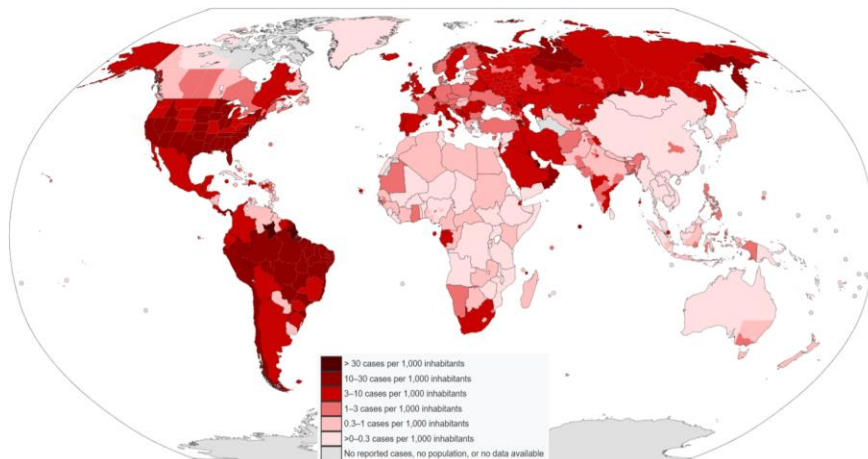
Figure 1

COVID-19 Statistics

Pakistan statistics   * Last updated:07 May, 2021 - 08:50am Islamabad/Pakistan

CONFIRMED CASES	DEATHS	RECOVERED	TOTAL TESTS	CRITICAL CASES
850,131	18,677	747,755	12,101,83	5,177
Last 24 hours: 4,298	Last 24 hours: 140	Last 24 hours: 4,631	Last 24 hours: 44,846	Last 24 hours: 70

Province wise Cases

289,646	122,520	314,517	77,414	23,016	17,660 / 5,358
SINDH	KPK	PUNJAB	ISLAMABAD	BALOCHISTAN	AJK/GB

COVID-19 Status in Pakistan

Source: http://covid.gov.pk/

Figure 2

Number of COVID-19 Cases Worldwide

> 30 cases per 1,000 inhabitants
10–30 cases per 1,000 inhabitants
3–10 cases per 1,000 inhabitants
1–3 cases per 1,000 inhabitants
0.3–1 cases per 1,000 inhabitants
>0–0.3 cases per 1,000 inhabitants
No reported cases, no population, or no data available

Source:https://commons.wikimedia.org/wiki/File:COVID19_
Outbreak_World_Map_per_Capita.svg (August 8, 2020)

The pandemic enforced a complete lockdown of markets, economies and social activities in various parts of the world. As indicated by the WHO, all countries are exposed to this pandemic (McNeil, 2020). Therefore, human mobility restrictions were imposed by most of the countries where they were needed at the earliest (Yu, et al., 2020; Charu et al., 2017; Wang & Taylor, 2016; Bajardi et al., 2011). Experts from all over the world requested their

governments to move their states towards a complete lockdown (Mitjà et al., 2020).

The sheer scale and scope of this outbreak and the disruptions it has caused globally makes it a natural disaster of an extraordinary proportion. The current pandemic is an inimitable crisis which has triggered a humanitarian crisis as well as a global (and local) economic recession. According to the statistics of the World Integrated Trade Solution (WITS), primary signs indicate that Pakistan's heavy economic reliance on USA (12.49% share in imports) and China (9.07% share in imports), its largest trade partners, translates into a source of tourism revenue and investment that will intensify the impact of the COVID-19 crisis in the country. The COVID-19 outbreak has created new vulnerabilities in Pakistan's socioeconomic life.

Pakistan's health and education sectors are experiencing pressure and health risks that threaten the achievement of Global Development Goals, the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs), especially as these relate to the "leaving no one behind" agenda which entails keeping a balanced approach for development and growth within the environmental and social paradigm. The poor state of education in Pakistan has been pointed out by a number of researchers (Memon, 2007; Lynd, 2007; Aslam & Siddiqui, 2003; Coleman, 2010; Khalid & Khan, 2006). The existence of multiple systems of education has always been a threat to the poor and middle-income families of Pakistan. Teaching methods have remained ineffective in terms of enhancing the students' learning capabilities. Moreover, the number of schools in the country is insufficient and a growing population has made it a bigger challenge.

Low-cost schools were hit the hardest by the pandemic. Unlike the elite schools charging exorbitant fees, these low-cost schools have almost no savings to meet their fixed costs during the lockdown. They were faced with a dual challenge in running these low-cost schools. It was impossible to run the school if the parents didn't pay the fee. However, the schools couldn't insist very much for the fee from the poor parents fearing a massive dropout as its consequence. On the one hand, charging tuition fee would trigger

the parents to withdraw their children from the school. On the other hand, fee waiver would translate into the school being forced out of business. Paying salaries to the staff and rent to the landlord became a nightmare for them in the absence of any relief package or interest free loan scheme offered by the government.

Universities are also faced with the same issues. They will not open anytime soon. This pandemic has had a negative socioeconomic impact across the world and educational institutions are also part of the fallout. Students are unable to pay their fees due to the dwindling incomes of their parents. Consequently, most universities are struggling to generate sufficient revenue to maintain operations as government grants are almost non-existent in Pakistan. A majority of the students have decried the decision of the universities to charge their fee, as they either want it to be waived off or slashed through fee concessions which is financially burdensome for the universities, in particular when the government also instructed universities for providing financial relief to the students. Moreover, additional costs are incurred while acquiring online education and examination software. Students are also suffering as a large number of them belong to rural areas, without access to good computers, electronic devices and internet facility.

The failure of the online mode of teaching and learning was identified and experienced by more than 70% of the higher education institutes (HEIs) across the country. Pakistan, like other South Asian countries, was ill prepared for online teaching and learning because of unreliable internet availability in the remote areas of the country. The higher education commission (HEC) insisted all universities to engage their students through online teaching, but the non-availability of smart phones, laptops and other electronic gadgets led to the failure of digital education in the country.

The country has already experienced a university closure in the past which was due to terrorist activities. The year 2020 is another year in the history of the country in which the student body has been affected adversely. In Baluchistan, the situation is very bleak, as the fiber optic network is still unavailable in large parts of the province. There are nine districts in the province that utterly lack any mobile

internet service (Baloch & Musyani, 2020). There are some countries including China, USA, Germany and Canada that have reopened their educational institutes in phases by employing various rotation models. Pakistan has also devised a plan to reopen its universities in rotation. However, the strict observance of SOPs remains doubtful. The future is uncertain, and no one knows how long will it take the virus to become ineffective. However, this virus has opened a host of opportunities for the administration, faculty and policymakers to digitalize the modes of education.

> "Smart Education is about the 5Es – Education that is enjoyable, engaging, efficient, effective, and ethical. First, enjoyable learning helps the retention and transfer of knowledge to long-term memory. Second, making learning engaging requires pedagogy as well as innovative application of technology such as gamification. Third, learning needs to be efficient in terms of time and resources. Fourth, Smart Education must be effective not only for achievement but must focus on accomplishment, which means going beyond individual success to make the world a better place. Fifth, Smart Education is ethical, for it addresses issues of privacy, cyber security and equity."- *Professor Asha Kanwar President & CEO, Commonwealth of Learning (COL)*

This study, thus, proposes and highlights areas in the education sector that require intensive research.

Literature Review

The pandemic has created new challenges for the global research community in the field of economics. It should aim to explore and explain the impact of COVID-19 on the global economy besides undertaking research on other important aspects of the pandemic, relevant to the discipline. The aspects of the global economy that were worst hit by the pandemic include shrunk volumes of international trade, struggling business enterprises and labour market unrest due to heavy job losses. The literature looks at various impacts of the pandemic at the national and global level. It necessitates a policy to overcome the widespread effects on the social, political and industrial sectors during an emergency situation.

Researchers have penned down their opinions, analysis and future forecasts using various econometric techniques, simulations and descriptive analysis. Researchers have identified that crude oil, stock market, gold and metals are some of the most adversely affected sectors of the global marketplace (Xiang et al., 2020; Haleem et al., 2020). Haleem et al. (2020) explained the impact of the pandemic on the manufacturing sector and its eventual impact on the global supply chain system. There are a lot of areas in which research related to COVID-19 can be conducted in order to prevent its further outbreak and to control its widespread impact (Haleem et al., 2020). Future research on this issue is most likely going to be multi-disciplinary and trans-national. Economists, biologists, medical scientists, epidemiologists, public health specialists, statisticians and public policy specialists need to do more research to help the global community come out of the crisis posed by the current pandemic (Haleem et al., 2020).

A recent study highlighted the impact of the pandemic on financial markets all over the world. It showed that the pandemic has created unimaginable higher levels of risks, causing losses to the investors in a very short span of time (Zhang et al., 2020). Moreover, there is a debate among the researchers on the pattern of the post-pandemic recovery in a historical sense, with the researchers taking two broad positions called U-shaped or V-shaped recovery expectations. The difference between the two groups is over the range of recovery time. Those who foresee a quick and sharp recovery (V-shaped) are optimists, while those who expect the negative impact to linger on (U-shaped) are pessimists.

The analysis of the 2007 National Education Consensus (NEC) showed that many schools are already in need of better facilities to improve the teaching learning process. Liu et al. (2020) showed that continuous investment in human capital is needed in order to have higher wage premiums. However, if the government fails to digitalize education in the country then there will be a time when unskilled labor will influx the labor market of the country.

According to Coleman (2010), *"Pakistan's demographic characteristics have immediate implications for education. Its huge and burgeoning population needs to be educated, yet more or less*

half of the population is of school age." In this pandemic, the urgency for the provision of education has become even more intense and severe.

Education Sector, Digitalization and Technology Improvement

As discussed earlier, the education sector in Pakistan has always received less governmental attention and budgetary support. Teachers in both private and public institutions receive minimal training aimed to improve teaching methods in general and online teaching methods in particular. Hence, it is imperative to inform the teachers and the student body about the technologies available in order to enhance sustainable and quality education during the COVID-19 period. Table 1 represents all those areas of the education sector in Pakistan that require the introduction of various instructional tools and assessment strategies.

Table 1

Areas of the Education Sector that Require Research in the COVID-19 Scenario

1. Digital Education

- Group based projects can be assessed using *Asana* which is used to track work and stay on task.
- *Evernote* can be used to jot down notes and similar apps should be introduced to graduate level students. Through *Evernote*, notes are synchronized across multiple devices and notebook organization helps keep the proverbial ducks in a row. It facilitates audio recording and allows taking meeting notes. Moreover, *slack, iStudiez, and Outliner* were identified by the academic affairs division at the graduate school of the University of Louisiana at Lafayette to facilitate online learning.
- *InstaGrok* presents the information in the best way, that is, with images, relationships, videos, concepts, facts and figures and so on.
- There is an educational need to make online teaching videos. *BlueBerry Flashback Express Recorder and Sony Voice Recorder* allows teachers to be visible onscreen through webcam with the option of recording. Others include

Screenr, Rylstim Screen Recorder, Krut, Webineria, Screen-O-Matic and *CamStudio* that allow screen and voice recording and are being used internationally (Pappas, 2013).
- There are several other apps that can facilitate online learning but there is a need to explore all of them and introduce them to the teachers and students at the same time.

2. **Assessment Application and Tools**
   - Formative and summative assessment tools need to be explored.
   - Tools like *Socrative* and *Plickers* should be implemented to ensure student assessment.
   - *Diagnoser* should be used for teaching science and mathematics.
   - The instructors should be encouraged to prepare problems based on strategic learning scenarios and undertake formative assessment to understand the weaknesses and strengths of the class participants.
   - Similarly*, Kahoot!, Canvas, Blackboard, Nearpod, Renaissance Accelerated Reader, TestOut Corporation, Renaissance Star Assessments, Alta, Survey Anyplace ,ExamSoft* can help instructors to assess the work of students.

3. **Accommodating Special Needs**
   - The learning experience should not suffer because of the unavailability of learning gadgets due to budgetary and technological constraints faced by the learners.
   - There is organizational support available for such an endeavor given by organizations providing open access to resources prepared in the light of the best practices and in the form of high quality content, available for free or at minimal cost. The consortium of Worldwide Web offers such facilities.

4. **Project-based Learning (PBL Lessons)**
   - The preparation of PBL lessons takes a lot of time. It may take a teacher weeks to prepare an effective and engaging lecture for students.
   - To start preparing a lesson, identify the instructional goals and the content students need to master.

- Each lesson plan has specific objectives that require a suitable mode of instruction.
- Authenticity, sustained inquiry, optimal challenge and autonomy of the learner are arguably the four essential elements of PBL lessons according to the Buck Institute for Education which "involves an active, in-depth process over time, where the students raise questions, identify and use resources, ask further questions, and develop their own answers" (Kosturko, 2015).

5. **Mobile-based Strategies for developing Self-Regulated Learners (SLR)**
   - SLR based instruction can be adopted both locally and globally.
   - Students can manage their work across different classes and also participate in extracurricular activities conducted virtually, such as virtual tours of libraries, museums and other.
   - Student autonomy can be ensured through SLR behaviours and strategies.

6. **Student Engagement**
   - There is a need to assign students specific activities such as brainstorming activities.
   - Students must be given what they need in bit-sized pieces.
   - Identifying daily and weekly objectives would help to keep students engaged.
   - Students need to be communicated the rules and procedures in collaboration with the respective institution as it builds relational trust in that institution.

Many students belong to far flung areas lacking internet facilities and awareness about digital education. Online teaching has to be promoted and used all over the country to provide sustainable quality education (Awan & Hussain, 2020).

Pakistan has also opted for online learning tools following the examples of their successful adoption in the developed countries. HEC has laid out six fundamental requirements for distance learning on their official website.

Vice chancellors have been requested to proceed with online classes if and only if they can certify *personally* that six key elements are effectively available. (a) *University Readiness*, that is, an effective and operational learning management system (LMS) as well as an oversight body responsible for certifying courses as online ready; (b) *Faculty Readiness*, that is, faculty members have gone through training in online teaching before being allowed to teach an online course; (c) *Course Readiness,* that is, all key information about a course is available on LMS; (d) *Library Readiness,* that is, all course readings and assignments are available through online means; (e) *Technology Readiness,* that is, the technology needed for delivering online classes is ready for deployment; and (f) *Student Readiness,* that is, students are assisted in overcoming any obstacles they may face in accessing the classes and teaching material.

The purpose of achieving educational goals is only possible with prompt internet accessibility and timely availability of electricity to the students in remote areas. The essence of learning can only be achieved if students are accommodated with electronic gadgets through budgetary funds as done by some local communities and developed countries in the world.

"Karang Taruna Petamburan, a youth organization in Tanah Abang, Central Jakarta, for instance, has collaborated with a non-governmental organization Indonesia Resilience (IRES) and crowdfunding platform Kitabisa to open makeshift learning centers equipped with smart devices and wireless network that local students are able to access for free, under the supervision of adult volunteers" (Fachriansyah, Fakhma, & Pujiyanto, 2020).

The government should increase educational expenditure as the percentage of GDP so that the literacy rate, learning facilities, quality of faculty and the quality of education can be improved in the overall sense as well as in the COVID-19 period (Awan & Hussain, 2020).

Data, Methodology and Results

The current study is based on the survey analysis of the online teaching experience. A questionnaire was developed to analyze the

online teaching experience of the faculty from both the private and public sector universities of Lahore and Islamabad. The questionnaire was sent to the faculty members of prominent public and private sector universities that were using online teaching tools to continue providing educational services to their students.

In this study, a total of 350 respondents participated. Of these, 189 respondents (54%) were designated as lecturers, 121 respondents (34.6%) were designated as assistant professors, 27 respondents (7.7%) were professors, 5 respondents (1.4%) were designated as research scholars and 8 respondents (2.3%) worked as technical staff.

The survey was conducted online using google forms filled by the faculty of the selective public and private sector universities of the Punjab. The main objective and concept of the research survey were well-communicated to the respondents before they filled the questionnaire. The questionnaire consisted of thirty-two questions based on demography, online teaching experience and institutional support for students and faculty.

The Cronbach alpha value of the questionnaire was found to be 0.845, which represents its high internal consistency. The Cronbach alpha value for 15 items of computer and information technology was found to be 0.828, representing high internal reliability and adequacy of questions. On the other hand, the Cronbach alpha value 0.823 for 13 colleges and universities differed in the extent to which universities emphasized or focused on the various aspects of the students' development, thus validating the sufficiency of questions to this particular aspect. The Cronbach alpha value for 18 items of the questionnaire related to the gains through online teaching was observed to be 0.828. The value for work life balance was, however, 0.661, showing moderate internal reliability.

The descriptive statistics of the variables were obtained by analyzing faculty demographics. In this study, the number of male respondents was higher than the female respondents, which also shows that the male faculty ratio is higher in both public and private sector universities. In this study, 68.2% respondents were from private universities while 31.8% were from the public sector. Approximately, 92.5% respondents experienced either no or minor

internet connectivity during the sampled period, that is, from May 2020 to September 2020. The reason could lie in the sampling, whereby 0.91% of the respondents did not have any prior experience of online teaching.

Most of the respondents were between 26-35 years of age. Moreover, the majority of the respondents had been working in their current organization for more than 5 years. Furthermore, most of the respondents had a professional experience of more than 6 years.

Most of the faculty members showed their dislike for the online classes as illustrated in figure 3.

Figure 3

Faculty Linking for online classes in Pandemic
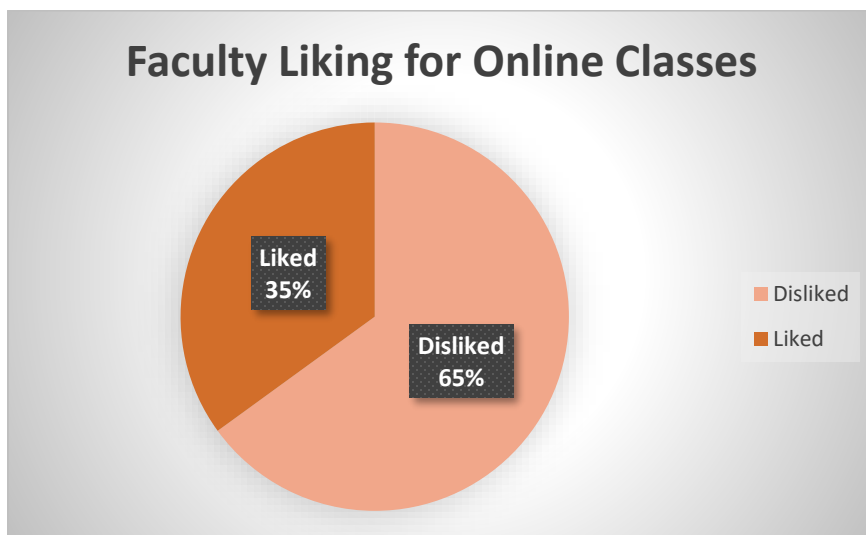
Moreover, 45.5% of the faculty agreed that their institute was facilitating them in successfully conducting online classes. As far as institutional support for the students was concerned, 84% of the faculty agreed that the institutions facilitated their students in the case of private sector universities, while only 68.5% of faculty from the public sector universities agreed that their students were supported by the institution. Another interesting finding of the study was that only 75% of the faculty agreed that there was comparatively less learning in online classes than those held on campus.

The results of the study were based on odd ratios (OR) for the responses where the dependent variable had two categories. The OR for the male faculty compared with the female faculty was (approximately) 0.73/0.64 = 1.14. Thus, the odds of a male faculty supporting online teaching for any reason were greater than the odds of a female faculty supporting online teaching for any reason. The magnitude was calculated as follows: when an OR is greater than 1, we calculate $100 \times (OR - 1.00) = (1.14 - 1.00) = 14\%$. The odds of a male faculty supporting online teaching was 14% greater than the odds of a female faculty supporting online teaching. If there is no clear independent or dependent variable, it is usually the best to make the row variable the one with the most categories. The study used the chi-square to assess the significance of the relationship. The relationship between perceived computer and information technology (IT support) and an emphasis on developing aesthetic, expressive, and creative course designs during COVID-19 by the institution was observed to be statistically significant: $\chi2(18, N = 350) = 182.17$, $p < 0.001$. One variable was selected as the independent variable. It was the emphasis on developing aesthetics, that is, developing expressive and creative course designs during COVID-19 by the institution. The results revealed that only 18.35% of those with less emphasis said they were very poor in computer and information technology compared with 49.18% of those with excellent computer skills. Similarly, only 5.99% of those proficient in IT skills said there was not enough emphasis on developing the aesthetic, expressive, and creative course designs during COVID-19 by the institutions. However, 33.03% of those with poor IT skills said there was not enough emphasis on developing aesthetic, expressive, and creative course designs during COVID-19 by the institutions.

Conclusion

COVID-19 is affecting the economies across the globe. The initial challenge was of developing a vaccine for this disease but after the development of a number of vaccines, the bigger challenge is getting people vaccinated in an equitable manner – not just across different regions of a given country but across rich and poor countries also. The impact of COVID-19 permeates into the various sectors and sub-sectors of the economy. Trade, business, tourism,

health and education are the most affected. Stock markets across the globe have faced dire consequences of the pandemic. Education sector of Pakistan is lagging behind many developing and developed countries which is evident from its educational indicators. The country was not prepared for the pandemic and the lockdown and its educators and instructors were not prepared for going online throughout the period of the lockdown. Universities, colleges and schools had to take various measures to avert the threats posed by COVID-19 towards their respective core functions. The development and adoption of these measures require a careful and cautious approach. Instructors need to enhance online communication and the frequency of interaction with their students using various mobile applications and the aforementioned online tools. Educational institutes should take effective measures to avert the consequences of COVID-19. The HEC must devise plans to train the faculty to help them in the continuation of their tasks using the required tools and assessment strategies. The information obtained from the faculty members of different colleges and universities will help educators, faculty members, university authorities and others to improve the conditions that contribute to effective online learning and development. The massive opportunity of across the board adoption of online teaching is likely to furnish a promising future for virtual learning in Pakistan.

Policy

As for policy, the government and HEC should adopt effective policies to check the dropout rate during COVID-19. The students, as a result, would start engaging in their academic routine with a feeling of safety and trust. During the COVID-19 lockdown, the instructors must identify the students who are at a risk of disengagement with their respective institution. It has been argued in the literature that failing grades, low attendance and poor behavior are the most important indicators of student disengagement (Allensworth et al., 2014; Balfanz et al., 2007; Bowers et al., 2013). The faculty and administration of the academic institutions, therefore, should keep track of these indicators for the successful retention of their student body. Academic institutions should provide such students with personalized support according to their respective needs and circumstances.

In the absence of effective policy measures, every student of the current cohort in higher education could face an average reduction in the yearly earnings of approximately $872, which is equivalent to $16,000 over a student's worklife at the current value (World Bank, 2020). Such evidence necessitates the adoption of policy measures to ensure student engagement in the academic process because the pecuniary implications of their dropout stays with them for the rest of their lives. Moreover, a specific policy for girls should be adopted as they are the most vulnerable and excluded group in almost all developing countries, in particular with regard to access to education. Safe reopening of schools must be ensured by the government to facilitate a more engaging learning environment characterized by its traditional toil as well as its technological flair. Lastly, if the situation continues to aggravate, alternative tools of communication such as mobile phones, radio, print media and television must be used to provide education, while ensuring an equitable access to education for the marginalized sections of the society.

References

Allensworth, E. M., Gwynne, J. A., Moore, P., & De la Torre, M. (2014). *Looking Forward to High School and College: Middle Grade Indicators of Readiness in Chicago Public Schools*. University of Chicago Consortium on Chicago School Research. 1313 East 60th Street, Chicago, IL 60637. https://eric.ed.gov/?id=ED553149

Aslam, M., & Siddiqui, R. (2003). The Determinants of Student Achievement in Government and Private Schools in Pakistan [with Comments]. *The Pakistan Development Review*, *42*(4), 841−876.

Awan, A. G., & Hussain, S. F. (2020). The Role of Quality Education in sustainable development of Pakistan. *Global Journal of Management, Social Sciences and Humanities*, *6*(2), 293−319.

Bajardi, P., Poletto, C., Ramasco, J. J., Tizzoni, M., Colizza, V., & Vespignani, A. (2011). Human mobility networks, travel

restrictions, and the global spread of 2009 H1N1 pandemic. *PloS one*, *6*(1), e16591. https://doi.org/10.1371/journal.pone.0016591

Baldwin, R., & Di Mauro, B. W. (2020). Economics in the time of COVID-19: A new eBook. *VOX CEPR Policy Portal*. 1-6. https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases

Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist*, *42*(4), 223-235. https://doi.org/10.1080/00461520701621079

Baloch, S. M., & Musyani, Z. (2020). Pakistan's great digital divide. The Diplomat. https://thediplomat.com/2020/07/pakistans-great-digital-divide/

Bowers, A. J., Sprott, R., & Taff, S. A. (2012). Do we know who will drop out? A review of the predictors of dropping out of high school: Precision, sensitivity, and specificity. *The High School Journal*, *99*(2), 77-100. https://www.jstor.org/stable/23351963

Charu, V., Zeger, S., Gog, J., Bjørnstad, O. N., Kissler, S., Simonsen, L., Grenfell, B. T., & Viboud, C. (2017). Human mobility and the spatial transmission of influenza in the United States. *PLoS Computational Biology*, *13*(2), e1005382. https://doi.org/10.1371/journal.pcbi.1005382

Coleman, H. (2010). *Teaching and learning in Pakistan: The role of language in education*. Islamabad: The British Council, 148-157.

Fachriansyah, K., Fakhma, F., & Pujiyanto, E. (2020, October). Framework to assess technology readiness of lithium-ion battery to fulfill the safety standard: IEC 62660-3: 2016 (case study: Smart lithium battery of UNS product). *In IOP Conference Series: Materials Science and Engineering* (Vol. 943, No. 1, p. 012052). IOP Publishing.

Haleem, A., Javaid, M., Vaishya, R., & Deshmukh, S. G. (2020). Areas of academic research with the impact of COVID-19. *The*

American Journal of Emergency Medicine, *38*(7), 1524-1526. https://doi.org/10.1016/j.ajem.2020.04.022

Khalid, S. M., & Khan, M. F. (2006). Pakistan: The state of education. *The Muslim World*, *96*(2), 305-322.

Kosturko, L. (2015). *Getting Smart on Tomorrow's Classroom: Free innovative tools, resources & apps*. 1-21. https://www.sas.com/content/dam/SAS/en_us/doc/other2/getting-smart-on-tomorrows-classroom.pdf

Liu, Z., Memon, A. A., Negussie, W., & Ketema, H. (2020). Interpreting the sustainable development of human capital and the sheepskin effects in returns to higher education: empirical evidence from Pakistan. *Sustainability*, *12*(6), 2393.

Lynd, D. (2007). *The education system in Pakistan: Assessment of the national education census. Islamabad*. UNESCO Islamabad, Pakistan. 1-42.

McNeil, D. G. (2020). Coronavirus has become a pandemic, W.H.O. says. *The New York Times*. http://www.nytimes.com/2020/03/11/health/coronavirus-pandemic-who.html

Memon, G. R. (2007). Education in Pakistan: The key issues, problems and the new challenges. *Journal of Management and Social Sciences*, *3*(1), 47-55.

Mitjà, O., Arenas, À., Rodó, X., Tobias, A., Brew, J., & Benlloch, J. M. (2020). Experts' request to the Spanish Government: Move Spain towards complete lockdown. *The Lancet*, *395*(10231), 1193-1194.

Pappas, C. (2013). The 8 Best Free Video Tools For Teachers. https://elearningindustry.com/the-8-best-free-video-tools-for-teachers

Raza, S., Rasheed, M. A., & Rashid, M. K. (2020). Transmission Potential and Severity of COVID-19 in Pakistan. Preprints 2020, doi: 10.20944/preprints202004.0004.v1

Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K., & Kaushal, V. (2020). Study of knowledge, attitude, anxiety &

perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian Journal of Psychiatry*, *51*, 102083. https://doi.org/10.1016/j.ajp.2020.102083

Wang, Q., & Taylor, J. E. (2016). Patterns and limitations of urban human mobility resilience under the influence of multiple types of natural disaster. *PLoS One*, *11*(1), e0147299.

World Bank (2020). COVID-19 Could Lead to Permanent Loss in Learning and Trillions of   Dollars in Lost Earnings. World Bank Press Release (June 18, 2020). https://www.worldbank.org/en/news/pressrelease/2020/06/18/covid-19-could-lead-to-permanent-loss-in-learning-and-trillions-of-dollars-in-lost-earnings

Xiang, Y. T., Li, W., Zhang, Q., Jin, Y., Rao, W. W., Zeng, L. N., & Hall, B. J. (2020). Timely research papers about COVID-19 in China. *The Lancet*, *395*(10225), 684-685.

Yu, F., Yan, L., Wang,N., Yang, S., Wang, L., Tang, Y., Gao, G., Wang, S., Ma, C., Xie, R., Wang, F., Tan, C., Zhu, L., Guo, Y., Zhang, F. (2020). Quantitative detection and viral load analysis of SARS-CoV-2 in infected patients. *Clinical Infectious Diseases*, *71*(51), 793-798. https://doi.org/10.1093/cid/ciaa345

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*, *36*, 101528. https://doi.org/10.1016/j.frl.2020.101528