

## **Digital Transformation in Distance Learning: Problems and Challenges During COVID-19 Pandemic**

Sidra Noreen<sup>1</sup>  
Norman Reid<sup>2</sup>

### Abstract

COVID-19 has affected universities in many countries as face-to-face contacts were reduced to minimize virus transmission. It has required universities to move to online teaching and learning mode which caused diverse challenges. This study looks at the key problems and challenges as seen by both learners and academics of the Allama Iqbal Open University. For this purpose, 20 learners and 12 academics from the Faculty of Education were selected through purposive sampling technique. Qualitative data were gathered through focus group discussions and interviews. Thematic analysis was used to generate themes and codes. The major findings are that there is a lack of access to digital technology and reliable internet connectivity, especially for learners from rural areas. Both academics and learners lack experience in how to use the new technologies. Much of the software is insufficiently user-friendly with a lack of support offered. The study concludes that the effectiveness of rapidly growing digital learning will be greatly limited until these key challenges are addressed.

**Keywords:** *digital learning, problems and challenges, distance learning, COVID-19*

---

<sup>1</sup> PhD Scholar, Department of Education, Allama Iqbal Open University, Islamabad, Pakistan. Email: sidranoor71@gmail.com

<sup>2</sup> Emeritus Professor, University of Glasgow, Scotland. Email: dr\_n@btinternet.com

**Introduction**

The Corona Virus (COVID-19) was officially declared as a pandemic by WHO (World Health Organization) on March 12, 2020. The virus first appeared in Wuhan city of China in 2019 and spread to more than 200 countries. Because the virus spreads so easily, most countries adopted various lock-down procedures (UNESCO, 2020). It affected social, economic and educational areas around the globe. In the education sector, specifically, millions of learners were affected worldwide. Approximately 29 countries closed their educational institutions completely, affecting half of the world's population of learners (UNESCO, 2020; Viner et al., 2020). In other countries, there was a partial closure often with a mix of classroom learning and online learning. Social distancing has now become an essential way of life.

In Pakistan, on March 31, 2020, the Higher Education Commission (HEC) advised all universities to start online classes to facilitate their learners during the Pandemic (Xinhua, 2020). This required a very rapid shift from traditional face-to-face teaching and learning to online teaching and learning. Open universities often have extensive online provision, but they also offer opportunities for learners to meet locally and, sometimes, to gather more centrally. However, still much depends on recorded lectures and a wide range of printed materials.

Allama Iqbal Open University (AIOU) adopts open distance and online learning mode. However, it was demanding for a very large university like AIOU to move so rapidly to online learning, given the sheer number of students, courses and levels of instruction (Noreen, 2020). Technologically advanced countries around the globe have sufficient capacity to adjust large-scale advancements and to support their learners in different challenging situations. By contrast, for developing counties like Pakistan, it is a big challenge to provide quick and quality online services to learners. The problem often rests in inadequate and unreliable internet connectivity, especially in rural areas, as well as the lack of access to reliable computer equipment by learners (Noreen & Hafeez, 2016).

Because of these problems, AIOU has always depended on a considerable correspondence mode of instruction. The demands of COVID-19 generated major challenges in offering much more online provision. The sheer number of learners involved and the diversity of courses offered, as well as the problems associated with electronic communications in rural areas, made the problems very demanding. Earlier studies (Aydin & Tasci, 2005; Borotis & Poulymenakou, 2004)

also revealed that it is difficult for both academic staff and learners to adjust to new ways of instruction when they are more familiar with some face-to-face instruction along with much in the form of written material. Complete dependence on online learning makes considerable demands, as both academics and learners have to adjust to a new way of learning.

Some studies (Manfuso, 2020; Hodges et al., 2020; Ribeivo, 2020) have shown that the demands of COVID-19 have sometimes allowed universities to enrich their instructional system through increased flexibility in teaching and learning. Others have found it harder. There are two factors involved here. The first relates to what might be called digital competence; both teachers and learners need to be confident in the technologies available and how to use them for effective learning. The second relates to internet connectivity. It is here that a country like Pakistan faces problems, especially more in the rural areas. Electrical supplies are sometimes intermittent, and internet connections fail.

As far as the technical demands and the requirement for university teachers to develop new skills, there are also issues related to the attitudes. Some studies (Ribeiro, 2020; Fishbane & Tomer, 2020) have shown the importance of considering attitudes. It is never easy for any human being to adjust very rapidly to some major change and the change to online learning is no exception. However, many studies have looked at the effects of digital learning on the way learners gain understandings. Reid and Ali (2020) have reviewed the literature. The evidence shows consistently that the new technologies do not alter the way learners learn. That is determined by key principles that apply in all situations (Mayer, 2010). New technologies merely offer a different medium. However, teachers need to be willing to make the adjustments to develop online learning materials of quality, and learners need to be willing to make the adjustments to work with the new approaches. This is very much attitudinal.

The World Health Organization (WHO) recommended social distance policies where there is a conscious physical gap between people to prevent the spread of disease (Red Cross, 2020). For education, this suggested a move to online learning. Evidence is now starting to emerge that social distancing is much less important among children of school ages, and some countries quickly re-opened schools while still retaining strong measures of lock-down elsewhere including universities. Thus, with older learners, universities suddenly needed to embrace online learning, and, at the moment, there is no clear indication about how long this will last.

For any university to be able to offer its courses through online provision, there is a clear need for what is called a Learning Management System (LMS). For a university like AIOU to move from mixed modes of teaching to a system based entirely on distance online learning requires a considerable technological evolution in thinking and practice. Many faculty members of the university are not equipped with ICT training with being more used to employing face-to-face instruction, perhaps in various locations around the country, as well as extensive use of written materials. During the last few years, there was a growing experience in postgraduate courses in employing online provision. However, the numbers are smaller in that case. In this context, this study seeks to explore the online learning challenges which faculty members and learners of Allama Iqbal Open University (AIOU) are facing during the COVID-19 pandemic.

### **Theoretical Framework**

Harasim (2012) and Mayer (2010) reviewed the nature of online learning and learning models. Their work presented a rigorous analysis of the nature of online learning. According to them, it is important to recognize learning as predominantly mediated by various means, anything from speaking, demonstrating, showing, as well as through printed text or using videos. Digital learning is just another tool for learning. Online learning follows the 'rules' for learning which are determined essentially by the way the human brain operates (Reid & Ali, 2020). Digital learning offers scope for interaction, engagement with materials, and digital searching. However, the challenge is to maximize the benefit of digital learning in terms of the teacher presenting information with maximum learners' involvement. However, there must be collaboration and sharing of knowledge among learners in distance learning to encourage them to solve their learning problems. Distance learners cannot learn efficiently until they actively participate in learning.

### **Purpose of the Study**

Before the arrival of COVID-19, the Allama Iqbal Open University (AIOU) had been following a correspondence mode of instruction and some face-to-face learning in local educational centres. However, much depended on written text, video materials, and face-to-face activities at local centres scattered throughout the country as well as when learners were brought into the central campus. The virus forced the university to move much of its teaching and learning online. While many universities

worldwide also moved into a digital medium, universities in developing countries seemed to be facing additional problems. Inevitably, the move into digital teaching and learning places huge burdens on academic teachers as they re-adjust their courses for a different medium. However, the focus of this study is to explore the challenges faced by AIOU, where its learners are scattered widely.

This background led to two main questions:

1. What are the key problems distance learners face in a developing country when teaching is moved online?
2. What are the key challenges faced by academics as they move very rapidly to online instruction in a developing country?

### **Research Methodology**

The study followed a qualitative approach based on phenomenological design. The aim was to gain insights into the problems faced by both learners and academics working in AIOU as they moved into online learning. While there is no guarantee that the sample represented the entire university population exactly, the learners and teachers were typical of wider populations. Data were gathered through online focus group discussions with 20 learners who were taking the B.Ed. (Hons) course through LMS (learning management system) and face-to-face semi-structured interviews with 12 academics. Learners were selected in this way because this group had already been through two semesters following a distance mode of learning (employing numerous approaches), and they had now completed their third semester with online instruction. In addition, education involves those with backgrounds in the sciences, humanities and management areas.

With over 1.1 million learners, the Allama Iqbal Open University is the second-largest university in Asia. In the B.Ed. course, from where the sample was selected, there are over 5000 learners, encompassing a wide diversity of subject backgrounds. The course follows an education model where diverse subjects are taught concurrently.

For data collection, a focus group discussion guide was developed around a set of 6 questions. The interviews with academics involved 8 questions but, being semi-structured, it was possible to expand on these as the conversations developed. The probing questions were sufficiently broad to allow for expansion in directions considered important by the participants. In this way, the validity of the findings was enhanced and not restricted to any themes pre-determined in advance. To ensure anonymity, code numbers were assigned to participants, and the data

were recorded.

Academics and learners were informed through emails and telephone calls before the conduct of interviews and focus group discussions. Views of participants were recorded and noted. A Content Validity Index (CVI) was calculated for the validation of the instruments (interview guide and focus group discussion guide). For this purpose, five experts in the educational technology field were invited to categorize each question from 1 (not relevant) to 4 (highly relevant). It provided consistency ratings at 0.86 and 0.87 for the focus group questions and interview questions, respectively. While those do not guarantee that all relevant themes were explored, it does offer evidence that what was planned, was valid. However, in both focus groups and interviews, the participants were free to introduce themes they thought important, thus giving scope for any wider issues to be discussed.

Thematic analysis was used to generate themes and codes from the data. In this way, meta themes emerged as the data were analyzed. Data were summarized with each participant represented by a code (e.g., R3: respondent 3). Response summaries were compiled under the observed meta themes, and the frequency of responses (f) under each theme were noted. It was found that the main problems learners were facing in online learning could be categorized under three meta-themes: technical, managerial, and financial aspects. The data are summarized in tables 1 and 2.

## Findings

### Problems of Distance Learners

*Table 1*

*Problems of Distance Learners in Online Learning through LMS During COVID-19*

Meta themes	Sub-themes	Codes	Responses	f	
Technical problems	Internet connectivity	Voice dis-connectivity	R2, 3, 4, 8, 9, 10, 11, 12	8	
		One-way audio	R2, 3, 4, 5, 7, 8	6	
	Managerial Problems	Time management	Repeated login	R1,3 5, 6, 7, 18	6
			Less attendance surety	R6, 9, 10, 11, 19	5
Financial problems	Resource management	Mismatch of lecture timings	R2, 5, 7, 8, 9, 10	6	
		Overburden schedule	R2, 4, 5, 7, 8, 9	6	
		Low-quality picture	R3, 7, 9, 10, 12	5	
Financial problems	Internet connectivity	Less organized content	R4, 5, 8, 10, 19	5	
		Cost of internet packages	R1, 3, 5, 8, 9, 11, 12, 20	8	

**Technical Problems: Internet Connectivity**

The majority of learners indicated that they found it impossible to remain online without any internet dis-connectivity during their online lectures. They reported that they faced repeated voice dis-connectivity throughout each lecture. Typically, R3 noted: 'I become so stressed when I continuously face voice dis-connectivity when attending my online lectures. All the time during lectures, I have to keep on asking my tutors if I cannot hear their voices'. Along with this, the university has given one-way audio access for an online lecture which creates further problems for learners to discuss freely with their tutors during lectures. R4 added that: 'There is no proper way of communication as I can only hear the voice of my tutor during lecture and can only send or convey my messages to tutor by typing in the online chat box. This one-way communication is not comfortable for me to easily talk with my tutors'. The findings of the study conducted by Iqbal et al. (2021) also highlighted that it is very difficult for Pakistan to move towards efficient online learning because learners and faculty face problems in having fast internet connectivity which is central to all online learning.

Most learners found difficulty in logging in their attendance for their online lectures through the Learning Management Systems (LMS) used. Thus, R1 explained that 'After my login to online learning portal of the university I logout automatically without any notification and sometimes I do not know whether I am login or not during whole lecture time.' R5 further noted that 'Sometimes login button suddenly disappears and becomes red indicating that I am no more login or connected online with my tutor and I do not know what I should do next except missing my lecture or switch off my computer.' Continuous disconnection gives little certainty to learners regarding their login and attendance marking. R6 observed that 'Mostly I am not assured that I am properly log in and my attendance is marked or not by the system.'

**Managerial Problems: Time Management**

Learners found it difficult to attend lectures at the proper time as the university did not communicate the times involved. R9 explained that: 'The timing of lectures often does not match, for example, sometimes I get notification from my tutor that he/she will take the class on 9 am but on that time tutor often do not appear online or do not take the class at that time, so I have to wait for hours to attend my lecture on alternative time. This creates many difficulties for me to do my other life tasks along with my online studies with ease'.

R8 further added that ‘Sometimes tutor who was not available at the given time suddenly announces that he/she is going to take the class on alternative time, which is mostly at late night, which creates an extra burden for me to take consecutive classes. R6 added that: ‘It happens sometimes that tutor takes the class at late hours, e.g., at 11 pm, that further creates difficulty to attend late-night classes as I have to complete other homework/assignments for my next morning online classes’.

Clearly, there are organizational problems, and this can cause greater problems for female learners. Thus, Mellier (2020) observed that it is very difficult for female learners to take online classes when the timing was not clear as they had duties in managing their homes and families. Along with these, learners from rural areas have an additional problem of having low and poorer internet bandwidth.

### **Resources Management**

Most of the learners pointed out that they receive low-quality information from some of the tutors as they are not well prepared for lectures. R5 explained that ‘Most of the lectures I am attending are without any useful information, tutor just explains the written text throughout the whole lecture.’ R2 further added that ‘I do not receive any presentation, notes, and website related to the lecture from my tutors, which would help me in future during my exams preparation.’ The recent study findings of Aboagye, Yawson and Appiah (2020) also highlighted that the low quality of online learning material is one of the issues for learners during their online lectures. They do not get or receive quality learning material from their instructors.

### **Financial Problem: High Cost of Internet Connectivity**

Although the LMS (learning management system) giving student’s access to online classes is free, most of the learners are unable to afford internet charges. In this regard, R1 explained that: ‘I dropped one of my course online classes as it was very difficult for me to attend online lectures. I have to buy internet cards to get connected for my online classes. I have planned to take my missed online classes next semester, but I do not know whether I would be able to attend my online classes next time or not, as I am not assured at that time, I will be financially in such a position to bear the high cost of internet packages’.

The findings of earlier studies (Fishbane & Tomer, 2020; Noreen, 2020) also highlighted that the affordability of the internet is a big challenge for learners who have a low-income family background. The

cost of internet connection is a major challenge for distance universities to provide their learners free and flexible online learning environment during COVID-19.

## Findings

### Challenges of Academics

The data provided by interviews with academics is summarized in table 2.

*Table 2*

#### *Challenges of Academics in Online Instructions Through LMS During COVID-19*

Meta themes	Themes	Codes	Responses	f
Instructional challenges	Poor system integration	Instruction to a large number of learners	R1, 3, 5, 7, 8, 9	6
		Extensive lectures	R3, 6, 8, 9, 10, 11	6
		Learners focus on attendance.	R2, 7, 9, 10, 11, 12	6
		Intentionally missing lectures	R3, 4, 6, 9, 10, 11, 12	7
Technical challenges	ICT training	Difficulty in training learners during lectures	R5, 6, 8, 10, 11, 12	6
		Answering learners' inquiries	R4, 7, 8, 9, 10, 12	6
		Calculation of marks and grades manually	R2, 5, 6, 8, 9, 11	6
	Connectivity	Online instructions to learners of far-flung areas	R7, 8, 9, 10, 11, 12	6

### Instructional Challenges

Academics found it difficult to cope with large numbers. They saw the abrupt change from face-to-face to the preparation for online lectures as a high workload. They had to transform their course content into electronic content that must also be helpful and understandable for learners. R1 argued that 'It is very difficult for me to give online instructions to a large number of learners in the different study group because in each study group there are almost 30 to 40 learners in each group'.

The findings of Akkoyunlu and Soylu's (2006) study also noted that a sudden shift from traditional to digital learning created an extra burden for

faculty members of distance universities, placing an extra workload on them. In this situation, distance universities find it difficult to provide user-friendly and efficient online learning to a large number of learners. R3 further added that 'I have to prepare extensive lecture slides for learners as most of them demand lecture presentations for exam preparation.'

According to most academics, learners most of the time ask for their attendance marking. R2 explained that 'Almost all the time during lectures learners keep on asking from me whether I have marked their attendance or not which is quite irritating for me to maintain my focus on lecture properly.' Many of the learners intentionally miss their online lecture by not appropriately login for the online lecture. They become involved in their other tasks without letting their tutors know about not attending lectures. In this context, R9 added that: 'Most of the time during the lecture, I notice that some of the learners just log in and after logging in they become busy in other tasks of their daily life. I used to notice this thing when I did not get the answer to any question from them or for a long time during lecture they did not participate in the discussion, and when I asked them whether they were online or not, then they gave no answer'.

The findings of earlier studies (Adedoyin & Soykan, 2020; Mellier, 2020) also indicated that in online learning, attendance of learners had become a major challenge for instructors, as the concern of the majority of learners mainly related to their attendance marking while they are engaged in other tasks. At the same time, most of the learners keep on asking about the next lecture schedule and acknowledgement of their online visibility on the computer of the tutor.

### **Technical Challenges**

Most learners do not have sufficient knowledge in using ICT (Information Communication Technology). Therefore, it is very difficult to give instructions to all the learners in which most of them do not know how to handle online resources for their lectures. R5 explained that 'I have to give an online lecture to almost 6 groups in which there are 25-30 learners in each group, and most of them do not have training earlier how to learn online. It is very tough for me to give them training first and guidelines during the lecture about how to attend their online lecture'.

R4 further added that the 'majority of learners who are taking online classes do not have much knowledge and earlier experiences of attending online lectures. Therefore, they keep on asking different questions related to technical difficulties they face during online lectures, and I

have to answer their queries which creates frustration for me and also detracted me as I sometimes forget important points that I planned to convey to the learners’.

Most of the academics do not have previous experiences of online instruction, and they do not know how to resolve issues efficiently and complete their tasks. R2 noted that: ‘I have been taking online classes of last semester and at the end firstly I have to calculate marks and grades of learners manually and then enter these online portals as I did not know how to apply calculation formula given by my university. This took a long time to complete my tasks and, after the result declaration, most of the learners are still complaining that their marks and grades are not properly calculated.’

Academics are also facing challenges in giving instructions to far-flung area learners as most of them do not have internet connectivity. R7 observed that ‘Most of the learners for such areas that are in far-flung areas where there is no internet connection often do not attend online classes or sometimes, they attend only last two or three lectures which are quite difficult for me to explain to them what I have already explained to the learners who are regularly attending classes.’ The study of Noreen and Hafeez (2016) also highlighted that it is very difficult for distance universities to give online learning to the learners in which most of them come from far-flung areas and do not have reliable internet connectivity. Many open universities have developed all kinds of distance modes of learning but, with limited internet connectivity and inadequate training on the use of ICT devices, universities and colleges in developing countries have found the planning and implementing of online learning systems very demanding as several studies have demonstrated (Noreen & Malik, 2020; Tarus, 2011; Bates, 2005).

## **Discussion**

Distance universities faced many demands for the need to move online teaching under COVID-19 restrictions (UNESCO, 2020). The extra work for academics, as well as the demands arising from the need to support students in their learning, has been very considerable. Higher education institutions have sometimes found that the Pandemic has given an opportunity for educational institutions to work together to think about technological adaptation in order to face unexpected situations in the future (Abad et al., 2020; Bozkart & Sharma, 2020; Hodges et al., 2020; Vlachopoulos, 2020).

Implementing online learning does require extensive research and a

high level of corporate commitment in order to be able to develop quality planning, design, and implementation of online learning (Hodeges et al., 2020; Branch & Dousay, 2015). It is here that universities and colleges in developing countries face considerable challenges. Often, the increasing demands for potential students mean that higher education provision is on a rapidly expanding trajectory. Meeting these increasing needs becomes a dominant pressure on the universities. Moving to online teaching adds a burden that is scarcely sustainable (Bozkurt & Sharma, 2020).

The current Pandemic has increased the pressures given that digital technologies had to be developed so rapidly (Kopp, Groblinger & Adams, 2019). There has been little time to plan in any kind of strategic way or to provide the needed resources in a planned manner. In universities and colleges in developed countries, there are highly developed and often very sophisticated structures in place to support the easy application of digital technologies. Students have access to the libraries electronically while much of the university organization and administration is online in efficient, user-friendly ways. In developing countries, universities and colleges often face so many demands simply to keep up with growing numbers that the level of digital support is much more limited.

This study aimed to explore the specific difficulties faced by learners and academics with rapid conversion to online learning as a result of COVID-19, this all being set in a developing country context. Not only are the numbers of students enormous, with the rapid expansion of higher education, but the support services are often under great pressure to support academic teachers and students. In many countries like Pakistan, the availability of technical equipment and reliable internet connectivity poses major problems. The problems arising from lack of reliable internet connectivity are greatest in rural areas, and the Pandemic has increased the urban-rural divide in learning opportunities. The study findings of Noreen (2020) found that the lack of a good internet connection was a major problem and, for this reason, many learners do not choose to learn online, as they do not have any confidence that they will have access to efficient and reliable internet connectivity during their online learning.

The findings of the present study revealed that the key problems, for both learners and their academics, these were:

- Lack of reliable internet accessibility (sometimes caused by power supply problems).

- Lack of confidence in using digital technologies in a learning context.
- Lack of provision of training and support.
- Previous lack of experience, generating hesitancy and a desire to return to face-to-face learning and teaching.
- Lack of user-friendliness and technical support.

Malik (2020) has also noted that most academic teachers had internet connectivity, but universities were unable to provide free online learning to the learners at their homes. This penalized lower-income families. This problem even exists in highly developed countries where access to laptops is often provided, but lower-income families cannot meet the costs of internet connections. In the study here, the findings show that fewer female students have access to technical facilities when compared to male learners in Pakistan. Thus, online digital learning penalizes female students, students living in rural areas, and students from lower-income families. All this perpetuates and accentuates educational divides, already a problem in many developing countries.

It might be argued that any move towards online learning requires proper strategic preparation, including support for university teachers and learners, so they develop positive attitudes towards digital transformation. Developed countries have great advantages here in that easy and reliable internet connectivity has generated considerable confidence and experience. A sudden move into digital learning is thus less daunting. Indeed, the findings of earlier studies (Beech, 2020; Strielkowski, 2020) suggested that if the present digital movement is taken positively, it could become a benefit for learners and universities as they can take advantage of efficient online learning. For universities in developed countries, there is a long history of experience in coping with digital developments in learning systems. Developing countries often do not enjoy these advantages.

One of the aspects of the present study is the need for technical support of high quality. Academics need supports in developing their online teaching material. However, they also need great support in re-thinking their job. It is too easy to see the academic tasks in terms of knowledge transfer. If that was so, then books might be a better way forward for academics or access to lecture notes for learners to read. Education, at all levels, must involve an interaction between academics and learners. This study shows that both groups in a developing country were finding the use of online learning difficult in achieving this.

If the findings here are generalizable, then there are clear messages

for distance universities in developing countries. While the samples chosen were selected with great care to consider typical learners and academics (education involves those from a scientific paradigm, a humanities perspective, as well as social studies), the findings must be interpreted with caution. Nonetheless, they make sense in a developing country context and provide an agenda for action.

### **Conclusion and Recommendations**

There are no easy answers for universities in developing countries in seeking to solve power supply problems and the costs of internet access, especially in rural areas. However, there are areas where universities can take some steps to help. Firstly, it might be advantageous to think in terms of combining various modes of learning and not attempting to move digitally in one step. Printed materials and recorded lectures might be combined along with the use of mobile technologies. Secondly, academics need support. Not only do they need to understand the key principles underpinning the effective and efficient approaches to learning (xxx & xxx, 2020), but they also need technical support in the use of software and other ICT resources. Thirdly, there is a need for support for learners, especially those in rural areas where resources are often inadequate. Learners from such areas are placed at a serious disadvantage in that they lack experience and confidence in the use of new technologies. Energy and effort perhaps need to focus on these areas. Finally, universities need to collaborate so that, where there is good ICT expertise, this can be shared more widely.

The key issues identified in this study can be grouped under four headings. In Access to good technology, learners and their teachers need access to good user-friendly technology with reliable internet connectivity. In Costs of technology, the costs implicit in acquiring good technological resources and internet access are prohibitive for many students in Pakistan, especially in rural areas. In Use of technology, both teachers and their learners need considerable support in being to use the technologies to maximum advantage, with efficiency and reliability. In Management of technology, if universities in Pakistan are to embrace digital learning, quality systems to manage such learning must be in place and supported. This study has identified this as a major weakness in AIOU at the moment.

## References

- Abad, S. E., Zamar, M. D., Moro, J. C., & Garcia, G. R. (2020). Sustainable management of digital transformation in higher education. *Global research trends. Sustainability*, 12(5), 2107. <https://doi.org/10.3390/su12052107>.
- Aboagye, E., Yawson, J. A., Appiah, K. N. (2020). COVID-19 and e-learning: The Challenges of Students in Tertiary Institutions, 1 (1), 1-8. <https://doi.org/10.37256/ser.122020422>.
- Adedoyin, B. O., Soykan, E. (2020). Covid-19 Pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments*, 1-14. <https://doi.org/10.1080/10494820.2020.1813180>.
- Akkoyunlu, B., & Soylu, M. Y. (2006). A study on students' views on blended learning environment. *Turkish Online Journal of Distance Education*, 7(3), 43-56.
- Aydin, C. H., & Tasci, D. (2005). Measuring readiness for e-learning: Reflections from an emerging country. *Educational Technology & Society*, 8 (4), 244-257.
- Bates, A. W. (2005). *Technology, e-learning and distance education*: Library of Congress. Routledge. USA.
- Beech, P. (2020). World economic forum: These new gadgets were designed to fight COVID-19. Retrieved from <https://www.weforum.org/agenda/2020/04/coronavirus-covid19>.
- Branch, R. M., & Dousay, T. A. (2015). Survey of instructional development models. Association for educational communications and technology. Retrieved from [https://aect.org/docs/Survey of Instructional Design Models. Pdf](https://aect.org/docs/Survey_of_Instructional_Design_Models.Pdf).
- Borotis, S., Poulymenakou, A. (2004). E-learning readiness components: Key issues to consider before adopting e-learning interventions. World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, 1622-1629. Association for the Advancement of Computing in Education (AACE), San Diego, CA.

- Fishbane, L., & Tomer, A. (2020). As classes move online during COVID-19: What are disconnected students to do? Brookings. Retrieved from: <https://www.brookings.edu/blog/the-avenue/2020/03/20/during-covid-19>.
- Harasim, L. (2012). Learning theory and online technologies. NY:Routledge.
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. Educause Review. Retrieved from <https://er.educause.edu/articles/2020/3/the-differencebetween-emergency>.
- Iqbal, S., Farooq, S., Ahmed, S., Rehman, A. (2021). Online education in Pakistan during Covid-19 Pandemic: Student's perspective. Palarch's Journal of Archaeology of Egypt/Egyptology,18(1), 4218-4230.
- Kopp, M., Groblinger, O., & Adams, S. (2019). Five common assumptions that prevent digital transformation at higher education institutions. INTED Proceedings. <https://doi.org/10.21125/inted.2019>.
- Malik, M. (2020). The Coronavirus effect on Pakistan's digital divide. Retrieved from <https://www.bbc.com/the-coronavirus-effect-on-Pakistan/>.
- Manfuso, L. G. (2020, April 15). How the remote learning pivot could shape higher Ed IT. EdTech Magazine? Retrieved from <https://edtechmagazine.com/higher/>.
- Mayer, R. E. (2010). Learning with technology. In H. Dumont, D. Istance, D. & F. Benavides (Eds.), *The Nature of Learning: Using Research to Inspire* (pp. 179 -198). Paris: OECD.
- Mellier, M. A. (2020). Screams on a zoom call: The theory of homeworking with kids meets reality. Retrieved from <https://www.nature.com/articles/d41586-020-01296>.
- Noreen, S. (2020). Implementation of learning management system: A way ahead on the digital journey in distance learning. *Open Praxis*, 12(3), 329-342. <https://dx.doi.org/10.5944/openpraxis.12.3.1086>.

- Noreen, S., & Malik, M.A. (2020). Digital technologies for learning at Allama Iqbal Open University (AIOU): Investigating needs and challenges. *Open Praxis*, 12(1), 39-49. <https://doi.org/10.5944/openpraxis.12.1.1016>.
- Noreen, S., & Hafeez, A. (2016). Challenges of digital learning for distance universities of Pakistan. *Gomal University Journal of Research*, 32(2), 69-80.
- Reid, N., & Ali, A.A. (2020). *Making sense of learning: A research-based approach*. Springer, Cham., Switzerland. <https://doi.org/10.1007/978-3-030-53677-0>.
- Red Cross. (2020). What social distancing means. Retrieved from <https://www.redcross.org/about-us/news-and-events/news/2020/coronavirus>.
- Ribeiro, R. (2020). How university faculty embraced the remote learning shift. *EdTech Magazine*. Retrieved from <https://edtechmagazine.com/higher/article/2020/04>.
- Strielkowski, W. (2020). COVID-19 Pandemic and The Digital Revolution in Academia and Higher Education. Preprints. Retrieved from <http://doi.org/10.20944/preprints202004>.
- Tarus, J. (2011). Adoption of e-learning to support teaching and learning in Moi University (Master's thesis). The Moi University. Retrieved from <http://ir.mu.ac.ke:8080/xmlui/handle/123456789/548>.
- UNESCO. (2020). Education: from disruption to recovery. Retrieved from <https://en.unesco.org/covid19/educationresponse>.
- Vlachopoulos, D. (2020). COVID-19: Threat or opportunity for online education. *Higher Learning Research Communication*, 10(1), 16-19. <http://doi.org/10.18870/hlrc.v10i1.1179>.
- Viner, R., Russell, S., Croker, H., Packer, J., Ward, J., Stansfield, C, Booy, R. (2020). School closure and management practices during coronavirus outbreaks including COVID-19. *A Rapid Systematic Review*. 4, 397-404. [https://doi.org/10.1016/S2352-4642\(20\)30095-X](https://doi.org/10.1016/S2352-4642(20)30095-X).

Xinhua. (2020). Pakistani universities asked to start online classes amid COVID-19 spread. Retrieved from: <http://www.xinhuanet.com/english/2020-03/31/c-138933150.htm>.

Noreen, S. & Reid, N. (2021). Digital transformation in distance learning: Problems and challenges during COVID-19 pandemic. *Pakistan Journal of Distance and Online Learning*, 7(2), 01-18.