



Students' perspective on online learning during pandemic in higher education

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Accepted: 11 June 2022

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Abstract

This research provides an insight into the students' perspective on online learning during the pandemic. We conducted this research in one of the universities of Azad Jammu and Kashmir (AJK). A quantitative research design was employed, and cross-sectional research method was used. An online survey form was administered by using Google survey forms on Likert scale (N=405). The online survey and use of social media tools were adopted owing to the pandemic. The Google survey form was disseminated among the students by means of teachers through social media tools using convenient sampling technique. Chi-square results showed highly significant association among the variables. Regression analysis found that lack of technology, learning skills, and disconnectedness of internet, marking and grading issues, and mental growth are the predictors of the bad educational performance of the students. It is, thus, concluded that the students' educational performance is badly affected due to the online learning amidst the COVID-19 pandemic in AJK. It is suggested to the higher educational institutions to take the radical measures of preparedness during any such crisis to ensure the smooth online educational and learning environment to the students.

Keywords COVID-19 · Online learning · Pandemic · Grades · Mental issues · Performance

1 Introduction

The Coronavirus SARs CoV-2 greatly influenced the students' learning in higher education institutions (HEIs) across the globe (Agormedah et al. 2020; Rizun and Strzelecki 2020; Sá and Serpa 2020). As a result of COVID-19 urgency, the HEIs primarily suspended the educational activities on campus to avoid the spread of novel virus (Armoed

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2021; Lukong et al. 2020). It is pertinent to mention here that it was not possible for HEIs to keep the educational activities suspended for long (Budur et al. 2021; Leal Filho et al. 2021). The internet-based learning [online] was adopted an alternative solution to continue the educational activities (Kohli et al. 2021; Zai and Akhunzada 2020). Thus, governments took measures to contain pandemic by introducing online educational activities the world over (de Boer 2021; Rasheed et al. 2021). Consequently, Agormedah et al. (2020) in line with other researchers argued that educational activities shifted to online mode at massive level (Cecilio-Fernandes et al. 2020). This paradigm shift although brought smoothness in educational activities among developed nations (Aumjaud 2020). As developed countries have common usage of advance technology in universities (Muthuprasad et al. 2021). However, Adnan and Anwar (2020) asserted that majority of developing countries deficient in technology experienced it differently.

A substantial body of research work highlighted the problems of students during pandemic in developing countries (Almaiah et al. 2020). Traditional methods of teaching are generally used in the universities of developing countries (Irfan et al. 2020). Thus, students were less likely familiar with the e-learning mode before pandemic (Wargadinata et al. 2020). At the onset of pandemic' effects, the decision to initiate teaching activities online was dealt at different levels (Dwivedi et al. 2020; Murphy 2020). As governments in general and universities in particular took time to devise mechanism to shift teaching activities online (Ali 2020; Mishra et al. 2020). Jena (2020) analysed that online teaching affected learning of the students. Similar assertions are given by Onyema et al. (2020). They asserted that pandemic badly affected the performance of the students in higher education. They, like other researchers, further identified different factors that affect the student' performance. These factors include grades/CGPA issues (Fatonina et al. 2020), mental growth (Khattar et al. 2020), marks criteria (Mukhtar et al. 2020), and internet issues (Tanveer et al. 2020). By the same token, Fatonina et al. (2020) revealed that online learning affected scores/grades of the students. In the similar way, Zai and Akhunzada (2020) unveiled that students questioned the marking criteria while receiving the same answer sheet (Bączek et al. 2021). Baticulon et al. (2021) noted that students are unable to learn the skills. They also found that performance of the students is affected. As a result, students suffered from anxiety, stress, tension, and fear of infection (Agormedah et al. 2020; Farooq et al. 2020; Jena 2020). Chung et al. (2020) revealed students' issues of internet connectivity while Camara (2020) identified inefficient technology resulted into the distorted communication during the classes (Sheerman et al. 2020).

2 Study context

Like other developing countries, Pakistan is also deficient in technology (Farooq et al. 2020). Most of the educational activities are carried out traditionally on campus. It is worth mentioning that online educational activities were previously, before pandemic, limited to distance learning educational institutions in Pakistan. Although teachers and students were aware of online educational activities. However, they were neither trained nor provided equipment and environment to use online mode. Similar situation is found in HEIs of AJK. Therefore, this research is attempted in HEIs of Azad Jammu and Kashmir to know the students' perspective regarding online learning during pandemic.

3 Organization of the study

In this article, introduction section is followed by a detailed empirical literature discussed in the context of developed, developing and Pakistan. At the end of literature, a comprehensive conceptual framework is provided for the readers with hypotheses. Third section of article is methodology. A concise methodology is provided that covers the research design, research method, population, sampling, data collection tool, sources of data collection, measurement, use of SPSS, strategies of interpretation and presentation of data. Fourth section is results derived from analysis. It contained description of demographic variables and findings of hypotheses. Last section of article comprised discussions. A precise discussion has been made for the readers. At the end conclusion is drawn based on the analysis of data.

4 Literature review

The higher education system is in the continued process of structural change (Altbach 2005; Ansell 2008; Crosier et al. 2007). The universities have to keep pace with the needs, desires, requirements, and changing landscapes of the educational activities and institutions (Gibbons 1998; Hunt 2011; Marginson and Rhoades 2002). So, information technologies and the e-learning systems are found necessary factors in carrying out the educational activities in universities (Liaw et al. 2007). Thus, the HEIs are investing more on the technologies i.e., devices and online system to keep updating the e-learning process (Salloum et al. 2019). However, in the changing landscapes of the technology, major challenge for HEIs is to integrate the proactive e-learning system to reinforce the effective learning to the students (Samsudeen and Mohamed 2019). The online learning initiative was taken owing to the pandemic situation across the globe.

In the developed countries, use of technology in academia is normally carried out for the educational activities (Pearce et al. 2010; Volchik and Maslyukova 2017). The digital transformation is not a new phenomenon in higher educational institutions (Abad-Segura et al. 2020). These countries are efficient in technology and keep updating the educational e-learning systems with the passage of time (Castro Benavides et al. 2020). The online systems are utilized along with on campus educational activities according to the requirements (Xiao 2019). Normally, the e-learning has always been the part and parcel of the traditional educational system (Kuzu 2020). For the first time in history, the traditional educational system was replaced through online learning system due to the pandemic (Adnan and Anwar 2020). Initially, to curb the prevalence, the HEIs were closed, and educational activities were suspended (Chung et al. 2020). While looking at severity and dire consequences of the pandemic, educational activities were shifted to online systems as it was not possible to keep institutions closed (Fatonja et al. 2020). Although the online learning has been beneficial to the great extent however the issues have been reported by the students (Muthuprasad et al. 2021). As the research studies revealed that performance of students is affected due to online learning. Onyema et al. (2020) and Rasheed et al. (2021) revealed that students are not satisfied with complete shift of educational activities. Research also revealed that students complained about the grading and marking criteria as well (Rizun and Strzelecki 2020; Sheerman et al. 2020).

In developing countries, the situation is quite different to that of the developed countries. As most of the developing countries are deficient in technology (Kituyi and Tusubira 2013; Quimno et al. 2013). Similarly, there scant use of technology in HEIs (Sife et al. 2007). The use of technology is considered only for the meetings, conferences, and special events (Crosier et al. 2007). It is asserted that means of technology is restrained for the academic activities on campus (Salloum et al. 2019; Samsudeen and Mohamed 2019; Santos et al. 2019). Adnan and Anwar (2020) argued that it was very difficult for the HEIs to initiate the online learning due to the limited use of technology. However, it was to curb the prevalence of pandemic HEIs had to shift the academic activities online (Ali 2020). It is important to mention here that developing countries undersupplied in digital technologies suffered during the pandemic (Farooq et al. 2020). The effects of such a transformation were directly experienced by the students who were neither trained nor familiar with the excessive use of technology for the sake of academic pursuits (Mukhtar et al. 2020; Mumtaz et al. 2021). As the performance of the students was affected badly, they were unable to learn the skills (Rasheed et al. 2021). Moreover, students suffered from the tension, anxiety, stress, and fears of infection (Shoaib and Abdullah 2021; Wang and Zhao 2020). Similarly, students also faced the issues of grading and marking (Wargadinata et al. 2020; Zai and Akhuzada 2020). Almaiah et al. (2020) and (Anwar et al. 2020) found that students had the issues in technology use. Sheerman et al. (2020) added that majority of undergrad students had not access to technology either laptop or smart phones. It was further complicated when they faced the poor internet connectivity. As Zai and Akhuzada (2020) and TI (2020) elaborated that the poor internet is the issues of most of the students in developing countries. In the same fashion, Wargadinata et al. (2020) also asserted that students in developing countries are unable to learn and enhance the skills. Further, it affects the performance of the students (Alkamel et al. 2021; Almaiah et al. 2020).

5 Conceptual framework

While developing the conceptual framework, we have developed the following hypotheses.

Hypothesis 1 There is association between educational performance and lack of technology, grading and marking issues, low learning skills, internet, and mental issues.

Hypothesis 2 The bad educational performance is due to the lack of technology, grading system and marking issues, low learning skills, internet, and mental issues.

5.1 Dependent variable

Educational performance.

5.2 Independent variables

Lack of Technology, Grades, Marking, Learning Skills, Internet, and Mental issues.

6 Methodology

6.1 Survey tool and sampling

In this study, we selected quantitative research design and employed cross-sectional research method. We conducted this research in one of the universities of AJK. The Google survey was carried out from 20th October to 20th December 2020. The data was collected from the students studying in Bachelor and Master programmes. Keeping in view the lockdown situation, owing to the pandemic, it was not possible to organize a campus-based sampling survey, thus, online survey form was designed by using Google survey form (<https://docs.google.com/forms/>). It was also not possible to visit the students physically to get the questionnaire filled. Thus, the questionnaire was designed in English language and converted into Google survey form. Primarily, it has been helpful in the present situation of COVID-19 where social distancing and social isolation is strictly enforced to curtail the spread of virus. Secondly, students are not available on campus rather online learning/teaching activities were started since the pandemic. To determine sample size, we disseminated Google survey form among 1228 students. Out of 1228 students, 405 responded and filled the questionnaire. Thus, sample size of study was $n=405$. We did not use probability sampling technique as we were not sure whether the students will respond or not despite having data. To avoid the inconvenience, we used nonprobability convenience sampling technique. Among the four faculties, 46 teachers were identified, contacted and shared the Google survey form i.e., 15 from Arts, 12 from Sciences, 11 from Engineering and 8 from Health Sciences. The purpose of selecting the teacher was to access students because they were directly in contact with the students via online learning. By means of teachers, students were contacted and Google survey form was shared with them. The Google survey form was shared through a link containing brief introduction, objective, information about anonymity and confidentiality, procedure, and statement about the voluntary nature of survey was also printed on the front page of survey form. The survey form was circulated among teachers via university WhatsApp group and teachers further circulated among the students through WhatsApp and Microsoft Teams. As Microsoft Teams is recommended by university for the online learning. Thus, it is believed that every student would have the Teams account. The Google survey form was distributed among the 1228 students while 405 students responded over a period of two months. Thus, the response rate has been 33%.

6.2 Measures

The survey form comprised two portions. First portion was demographic information, and second portion was on the problems faced by the students due to online learning during the pandemic. In personal information portion, we asked question of age, educational level, faculty, and residence. In second portion, ten questions were asked about the issues they face in learning due to the pandemic. The second portion was purely designed on the Likert scale. After the formulation, the questionnaire was pretested, and omissions were removed. Thus, the Cronbach's Alpha ranged from 0.72 to 0.83 and to overall 0.88. Statistical Analysis was done and frequency (N) distribution of the demographic information was determined by means of SPSS. Two hypotheses were formulated and tested by employing Chi-square and Regression Model respectively. First hypothesis was to check the association of educational performance with lack of technology, grading and marking issues, learning

skills, internet, and mental issues. In the second hypothesis, predictors of bad educational performance of the students were: use of technology, grading and marking issues, learning skills, internet, and mental issues. The data was documented while all the statistical analyses were performed using SPSS Statistics, version 20, and Microsoft Excel 2018.

7 Results

7.1 Socio-demographic characteristics

Table 1 showed that the demographic information of the students. As the age of students is distributed as, 69.4 percent students fall in age bracket 20–25, 25.9 percent were of age 26–31 years and 4.7 [percent were found above than 32 years of age. The students belonged to four faculties of university. As 29.6 percent belonged to faculty of arts, 25.6 percent fitted into the faculty of arts, 25 percent in faculty of engineering and 19.7 percent from faculty of health sciences. The distribution of students according to the residence is found interesting as 62 percent belonged to the rural areas as compared to 38 percent belonged to urban areas. The educational level of students ranged from BS to PhD. A major proportion of students' 67.4 percent fall in the BS category, 19.8 percent having MSc/MA educational level, and 9.4 percent have MS and only 3.5 percent were earning the PhD degrees.

7.2 Hypotheses testing

Hypothesis 1 There is association between educational performance and lack of technology, grading and marking issues, low learning skills, internet, and mental issues.

Table 1 The demographic characteristics of the students

Sr. no.	Variables	Referents	Count	Percentage
1	Age	20–25	281	69.4
		26–31	105	25.9
		32 and Above	19	4.7
		Total	405	100.0
2	Faculty	Arts	120	29.6
		Science	104	25.6
		Engineering	101	25
		Health Sciences	80	19.7
		Total	405	100.0
3	Residence	Rural	251	62.0
		Urban	154	38.0
		Total	405	100.0
4	Educational Level	BS	273	67.4
		MSc/MA	80	19.8
		MS	38	9.4
		PhD	14	3.5
		Total	405	100.0

Table 2 shows the association of educational performance with different variables. As the lack of technology is highly significant with the results of $p < 0.000$. It is noted that results of all the variables included in hypothesis were most significant. The results suggest that the lack of technology impacts the performance of the students to the great extent during pandemic crisis. Similar arguments are given by Coman et al. (2020). They stated that technology has affected the educational performance of the students. The low grades are also highly significant with the low education performance indicating that performance is affected (Adnan and Anwar 2020). It is further revealed by Barrot et al. (2021). They asserted that low grades affect the performance of students. The effects on mental growth are also highly significant to the educational performance of the students (Faisal et al. 2021). As Abdullah and Shoaib (2021) found psychosocial impacts on the lives of people. Similarly, the performance is significantly associated with the educational performance of the students resulting that the marking issues negatively affected performance of the students (Fatonja et al. 2020). The results suggested that further supported by Ahmad et al. (2022). They found that performance is impacted by the low marking grades. The association between performance and learning skills is also significant that construes students' performance is affected, and they are unable to learn the skills due to online learning (Wang et al. 2020). Similar assertions are given by Dutta and Smita (2020) who described nexus of learning and performance are important for the good performance. In the same fashion, internet issue have association with the performance that shows that the performance is affected by the internet disconnectedness (Wargadinata et al. 2020). Similar results are given by many studies (Adnan and Anwar 2020). Based on the above findings, it is argued that educational performance has strong association with the lack of technology, low grades, effects in mental growth, marking issues, low learning skills and internet issues (Agormedah et al. 2020; Onyema et al. 2020; Tanveer et al. 2020). Thus, it is argued, the due to the online learning performance of the students in AJK is badly impacted due to internet disconnectedness. It is noted that students have less access to technology either laptop or smart phones (Rahiem 2021). Similarly, it is noteworthy that the students are unable to learn the skills at home (Hashemi 2021). Owing to these issues, students experience mental issues of stress, anxiety, tension, and fears (Abdullah and Shoaib 2021). Moreover, students also experienced the issues of score, marking and internet.

Hypothesis 2 The bad educational performance is due to the lack of technology, grading system and marking issues, low learning skills, internet, and mental issues.

Table 2 Chi-Square statistical test (dependent variable = educational performance)

No.	Variable/s	Pearson value	df	<i>P</i> -value
i	Lack of Technology	222.661 ^a	6	.000
ii	Low Grades	217.023 ^a	8	.000
iii	Effect on Mental Growth	325.455 ^a	8	.000
iv	Marking Issues	260.286 ^a	8	.000
v	Low Learning Skills	58.790 ^a	6	.000
vi	Internet Issues	309.314 ^a	8	.000
Total number of observations (n) = 405				

Table 3 revealed determinants of bad educational performance. It showed the most significant values of p values in each category of the analysis i.e., $P < 0.000$. These results show that lack of technology, grading and marking issue, low learning skills, internet and mental issues are predictor of the negative educational performance of the students. These significant values highlight the impact on the educational performance of the students. As the performance is affected using technology as the students were not aware about the use of technology and suffered in educational achievements (Abad-Segura et al. 2020; Castro Benavides et al. 2020). Similar findings are given by (Mahyoob 2020). He argued that use of technology has key role in educational performance. The performance of students is also affected by the grades of the students (Farooq et al. 2020). It is further supported by the argument of Tadesse and Muluye (2020) who noted that performance is linked with grades of the students. Findings revealed marks criteria discriminatory (Zai and Akhuzada 2020). It is also argued by (Tadesse and Muluye 2020). They stated that students were unable to learn the skills due to online learning (Tanveer et al. 2020). It is pertinent to mention that students suffered from the internet connectivity issues (Simamora 2020). All these issues added on the mental issues of stress, anxiety, tension and fears in students (Faisal et al. 2021; Tang et al. 2020). It is thus found that the educational performance is affected by the different predictors (Hashemi 2021; Tadesse and Muluye 2020). By looking at the β values, we found that learning skills and internet issues are the major indicators of the bad educational performance of the students (Fig. 1).

8 Discussions

The online educational activities were commenced amidst the pandemic due to the urgency of the disease (Aboagye et al. 2020; Adnan and Anwar 2020; Shoaib and Abdullah 2020). It has been revealed that the online educational activities were quite new in most of the developing countries like Pakistan (Cecilio-Fernandes et al. 2020; Chung et al. 2020). As these countries were either incapacitated or none even through to shift the whole system of education on e-learning (de Boer 2021; Dwivedi et al. 2020). However, same happened in Pakistan and

Table 3 An OLS multiple regression predicting educational performance of students (standard errors and parameter estimates)

Sr. no.	Variables	Unstandardized coefficients			Standardized coefficients	
		B	Std. error	Beta	t	Sig.
i	Technology	.170	.013	.312	11.016	.000
ii	Grades	.140	.011	.240	8.613	.000
iii	Mental Growth	.154	.012	.277	9.983	.000
iv	Marks Criteria	.113	.016	.167	6.043	.000
v	Learning Skills	-.270	.023	-.314	-10.766	.000
vi	Internet Issues	-.142	.014	-.303	-11.374	.000
	(Constant)	1.191	.046		20.821	.000
F = 106.473, Sig. = .000		R Square = 0.429, Adjusted R Square = 0.425. df = 6				
		Total number of Observation (n) = 405				

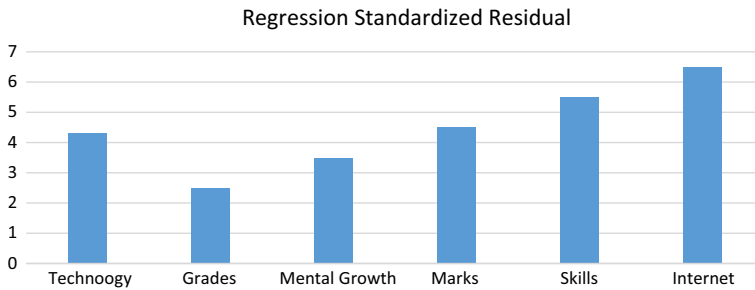


Fig. 1 An OLS multiple regression predicting educational performance of students

the learning was shifted to the online (Adnan and Anwar 2020; Ali 2020). This shift of educational activities has created a vivid gap in educational performance of the students the world over (Fatonja et al. 2020). Similar issues have been reported in Pakistan (TI 2020) and we also found that educational performance is affected badly due to online learning system during the pandemic. The research across the globe indicated the different factors of the bad educational performance of the students (Agormedah et al. 2020; Baticulon et al. 2021; Tanveer et al. 2020). These included, the lack of technology, grading and score issues, marks criteria, learning skills, internet issues and mental issues experienced by the students during the online learning (Khattar et al. 2020; Lukong et al. 2020). Crosier et al. (2007) found that the students in developing countries suffered due to the poor technology as the HEIs and management was not even prepared to initiate the learning online. Thus, due to lack or deficient technology, students were not able to properly take the online classes (Rasheed et al. 2021). Similar issues we found in the study that due to deficient technology students suffered in pandemic while learning online. The learning skills of the students were not enhanced, and they also experienced the issues of low grading and marking issues (Leal Filho et al. 2021). It further affected the performance of the students (Rasheed et al. 2021). In this study, we also found same issues of grading and marking impacting the students' performance (Azlan et al. 2020). Owing to the weak network, they were not able to attend the classes regularly (Lembani et al. 2020). The results of our study also endorsed the bad connectivity of students that further affected the performance. Research revealed that, due to all these factors, students experienced the mental health issues of stress, anxiety, tension, and fears (Faisal et al. 2021; Khan et al. 2020; Tang et al. 2020; Wang et al. 2020). In this case, we also reached at the vantage point that the students suffered from the mental issues due to the lack of technology and disconnected internet. It is thus revealed that the educational performance of the students was badly impacted due to the online learning amidst the pandemic crisis.

9 Conclusion

We reached at the conclusion that the educational performance of the students is mainly impacted by the lack of technology including internet. Similarly, students were unable to learn the skills and improve the scores. As the grading and marking criteria also impacted the scores of the students. Owing to these issues, they suffered from the mental issues of anxiety, tension, stress, and fears of losing scores and maintain the consistency. It is, thus, concluded that the students' educational performance is badly affected due to the online

learning midst the COVID-19 pandemic in AJK. It is suggested to the higher educational institutions to take the radical measures of preparedness during any such crisis to ensure the smooth online educational and learning environment to the students.

Authors' contributions This review article is written by the first and corresponding author while second author revisited the article and made major changes.

Funding The funding for this study was not available.

Availability of data and material All the material and data used in this study is available as many data bases were focused.

Code availability The data is simply processed through EndNote 9 and no other software is used.

Declarations

Conflict of interest Authors declare no potential conflict of interest.

Consent to publish All the authors contributed to the article and consented to publish the article.

References

- Abad-Segura, E., González-Zamar, M.-D., Infante-Moro, J.C., RuipérezGarcía, G.: Sustainable management of digital transformation in higher education: global research trends. *Sustainability* **12**(5), 2107 (2020)
- Abdullah, F., Shoaib, M.: Psychosocial impacts of COVID-19 pandemic: a cross-sectional study of Mirpur Pakistan. *Int. Rev. Sociol.* **31**, 470 (2021)
- Aboagye, E., Yawson, J. A., & Appiah, K. N.: COVID-19 and E-learning: the challenges of students in tertiary institutions. *Soc. Educ. Res.* **2**(1), 1–8 (2020). <https://doi.org/10.37256/ser.212021422>.
- Adnan, M., Anwar, K.: Online learning amid the COVID-19 pandemic: students' perspectives. *Online Submiss.* **2**(1), 45–51 (2020)
- Agormedah, E.K., Henaku, E.A., Ayite, D.M.K., Ansah, E.A.: Online learning in higher education during COVID-19 pandemic: a case of Ghana. *J. Educ. Technol. Online Learn.* **3**(3), 183–210 (2020)
- Ahmad, A., Shoaib, M., & Abdullah, F.: COVID-19 black swan and personal protective equipment (PPE) in Pakistan. *Health Educ.* **122**(4), 365–373 (2022). <https://doi.org/10.1108/HE-06-2021-0093>.
- Ali, W.: Online and remote learning in higher education institutes: a necessity in light of COVID-19 pandemic. *High. Educ. Stud.* **10**(3), 16–25 (2020)
- Aliyyah, R.R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., Tambunan, A.R.S.: The perceptions of primary school teachers of online learning during the COVID-19 pandemic period: a case study in Indonesia. *J. Ethn. Cult. Stud.* **7**(2), 90–109 (2020)
- Alkamel, M.A.A., Chouthaiwale, S.S., Yassin, A.A., AlAjmi, Q., Albaadany, H.Y.: Online testing in higher education institutions during the outbreak of COVID-19: challenges and opportunities. In: Arpacı, I., Al-Emran, M., Al-Sharafi, M.A., Marques, G. (eds.) *Emerging Technologies During the Era of COVID-19 Pandemic*. Springer, Cham (2021)
- Almaiah, M.A., Al-Khasawneh, A., Althunibat, A.: Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Educ. Inf. Technol.* **25**, 5261–5280 (2020)
- Altbach, P.G.: Patterns in higher education development. *Am. High. Educ. Twenty-First Cent. Soc. Polit. Econ. Challenge.* **2**, 15–37 (2005)
- Ansell, B.W.: University challenges: explaining institutional change in higher education. *World Polit.* **60**(2), 189–230 (2008)
- Anwar, M., Khan, A., Sultan, K.: The barriers and challenges faced by students in online education during Covid-19 pandemic in Pakistan. *Gomal Univ. J. Res.* **36**(1), 52–62 (2020)
- Armoed, Z. (2021). *The COVID-19 pandemic: Online teaching and learning at higher education institutes*. Paper presented at the IOP Conference Series: Earth and Environmental Science.

- Aumjaud, B. E. (2020). Critical reflection on teaching and assessment practices in a higher education setting in Mauritius during the COVID-19 pandemic national lockdown. *Editors: Dr UG Singh (University of KwaZulu-Natal, South Africa) Prof CS Nair (Victorian Institute of Technology, Australia) e-ISBN: 978-1-990901-49-2*, 160.
- Azlan, C.A., Wong, J.H.D., Tan, L.K., Nizam, M.S., Huri, A.D., Ung, N.M., Pallath, V., Tan, C.P.L., Yeong, C.H., Ng, K.H.: Teaching and learning of postgraduate medical physics using Internet-based e-learning during the COVID-19 pandemic—A case study from Malaysia. *Phys. Med.* **80**, 10–16 (2020)
- Bączek, M., Zagańczyk-Bączek, M., Szpringer, M., Jaroszyński, A., Wożakowska-Kapłon, B.: Students' perception of online learning during the COVID-19 pandemic: a survey study of Polish medical students. *Medicine* **100**(7), e24821 (2021)
- Barrot, J.S., Llenares, I.I., Del Rosario, L.S.: Students' online learning challenges during the pandemic and how they cope with them: the case of the Philippines. *Educ. Inf. Technol.* **26**(6), 7321–7338 (2021)
- Baticulon, R.E., Sy, J.J., Nicole, R.I., Alberto, M.B., Baron, C., Robert, E.C., Mabulay, L.G., Rizada, T., Christl, J.S., Tiu, C.A., Clarion, J.C., Reyes, B.: Barriers to online learning in the time of COVID-19: a national survey of medical students in the Philippines. *Med. Sci. Educ.* **31**, 615 (2021)
- Besser, A., Flett, G. L., & Zeigler-Hill, V.: Adaptability to a sudden transition to online learning during the COVID-19 pandemic: understanding the challenges for students. *Scholarship Teach. Learn. Psychol.* **8**(2), 85–105 (2022). <https://doi.org/10.1037/st0000198>
- Budur, T., Demir, A., Cura, F.: University readiness to online education during Covid-19 pandemic. *Int. J. Soc. Sci. Educ. Stud.* **8**(1), 180–200 (2021)
- Camara, W.: Never let a crisis go to waste: large-Scale assessment and the response to COVID-19. *Educ. Meas. Issues Pract.* **39**(3), 10–18 (2020)
- Castro Benavides, L.M., Tamayo Arias, J.A., Arango Serna, M.D., Branch Bedoya, J.W., Burgos, D.: Digital transformation in higher education institutions: a systematic literature review. *Sensors* **20**(11), 3291 (2020)
- Cecilio-Fernandes, D., Parisi, M.C.R., Santos, T.M., Sandars, J.: The COVID-19 pandemic and the challenge of using technology for medical education in low and middle income countries. *MedEdPublish* **9**, 74 (2020)
- Chung, E., Subramaniam, G., Dass, L.C.: Online Learning readiness among university students in Malaysia amidst COVID-19. *Asian J. Univ. Educ.* **16**(2), 46–58 (2020)
- Coman, C., Țîru, L.G., Meseșan-Schmitz, L., Stanciu, C., Bularca, M.C.: Online teaching and learning in higher education during the coronavirus pandemic: students' perspective. *Sustainability* **12**(24), 10367 (2020)
- Crosier, D., Purser, L., & Smidt, H.: *Trends 5: Universities Shaping the European Higher Education Area*: EAU (2007). <https://eua.eu/downloads/publications/trends%20v%20universities%20shaping%20the%20european%20higher%20education%20area.pdf>
- de Boer, H.: COVID-19 in Dutch higher education. *Stud. High. Educ.* **46**(1), 96–106 (2021)
- Dutta, S., Smita, M.K.: The impact of COVID-19 pandemic on tertiary education in Bangladesh: students' perspectives. *Open J. Soc. Sci.* **8**(09), 53 (2020)
- Dwivedi, Y.K., Hughes, D.L., Coombs, C., Constantiou, I., Duan, Y., Edwards, J.S., Gupta, B., Lal, B., Misra, S., Prashant, P., Raman, R.: Impact of COVID-19 pandemic on information management research and practice: transforming education, work and life. *Int. J. Inform. Manag.* **55**, 102211 (2020)
- Faisal, R.A., Jobe, M.C., Ahmed, O., Sharker, T.: Mental health status, anxiety, and depression levels of Bangladeshi university students during the COVID-19 pandemic. *Int. J. Mental Health Add.* **20**(3), 1500–1515 (2022)
- Farooq, F., Rathore, F.A., Mansoor, S.N.: Challenges of online medical education in Pakistan during COVID-19 pandemic. *J. Coll. Phys. Surg. Pak* **30**(6), 67–69 (2020)
- Fatonia, N.A., Nurkhatyatic, E., Nurdiawati, E., Fidzihae, G.P., Adhag, S., Irawanh, A.P., Julyantoj, O., Azizik, E.: University students online learning system during Covid-19 pandemic: advantages, constraints and solutions. *Syst. Rev. Pharm.* **11**(7), 570–576 (2020)
- Gibbons, M.: *Report on Higher Education Relevance in the 21st Century*. World Bank, Washington DC (1998).
- Hashemi, A.: Effects of COVID-19 on the academic performance of Afghan students' and their level of satisfaction with online teaching. *Cogent Arts Human.* **8**(1), 1933684 (2021)
- Hunt, C.: *National strategy for higher education to 2030*: Department of Education and Skills. Report of strategy group. Ireland (2011).

- Irfan, M., Kusumaningrum, B., Yulia, Y., Widodo, S.A.: Challenges during the pandemic: use of e-learning in mathematics learning in higher education. *Infinity J.* **9**(2), 147–158 (2020)
- Jena, P. K.: Impact of Covid-19 on higher education in India. *Int. J. Adv. Educ. Res. (IJAER)* **5**(3), 77–81 (2020)
- Khan, A.H., Sultana, M.S., Hossain, S., Hasan, M.T., Ahmed, H.U., Sikder, M.T.: The impact of COVID-19 pandemic on mental health & wellbeing among home-quarantined Bangladeshi students: a cross-sectional pilot study. *J. Affect. Disord.* **277**, 121–128 (2020)
- Khattar, A., Jain, P. R., & Quadri, S. (2020). *Effects of the disastrous pandemic COVID 19 on learning styles, activities and mental health of young Indian students-a machine learning approach*. Paper presented at the 2020 4th International Conference on Intelligent Computing and Control Systems (ICICCS).
- Kituyi, G., & Tusubira, I.: A framework for the integration of e-learning in higher education institutions in developing countries. *Int. J. Educ. Dev. ICT*, **9**(2), 19–36 (2013).
- Kohli, H., Wampole, D., Kohli, A.: Impact of online education on student learning during the pandemic. *Stud. Learn. Teach.* **2**(2), 1–11 (2021)
- Kuzu, Ö.H.: Digital transformation in higher education: a case study on strategic plans. *Высшее Образование в России* **29**(3), 9–23 (2020)
- Leal Filho, W., Price, E., Wall, T., Shiel, C., Azeiteiro, U.M., Mifsud, M., Brandli, L., Farinha, C.S., Caeiro, S., Salvia, A.L., Vasconcelos, C.R.: COVID-19: the impact of a global crisis on sustainable development teaching. *Environ. Dev. Sustain.* **23**(8), 11257–11278 (2021)
- Lembani, R., Gunter, A., Breines, M., Dalu, M.T.B.: The same course, different access: the digital divide between urban and rural distance education students in South Africa. *J. Geogr. High. Educ.* **44**(1), 70–84 (2020)
- Liaw, S.-S., Huang, H.-M., Chen, G.-D.: An activity-theoretical approach to investigate learners' factors toward e-learning systems. *Comput. Hum. Behav.* **23**(4), 1906–1920 (2007)
- Lukong, T., Tombari, C., Mbome, B., Ankinibom, C., Fru, P., Atong, H., Mbi, T.C., Juliet, M.E.: Psychological implications of COVID-19 on students learning outcome at the University of Buea, Cameroon. *Am. Res. J. Human. Soc. Sci.* **3**(8), 1–14 (2020)
- Mahyoob, M.: Challenges of e-learning during the COVID-19 pandemic experienced by EFL learners. *Arab World English J. (AWEJ)* **11**(4), 351 (2020)
- Marginson, S., Rhoades, G.: Beyond national states, markets, and systems of higher education: a glona-cal agency heuristic. *High. Educ.* **43**(3), 281–309 (2002)
- Mishra, L., Gupta, T., Shree, A.: Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *Int. J. Educ. Res. Open* **1**, 100012 (2020)
- Mukhtar, K., Javed, K., Arooj, M., Sethi, A.: Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era. *Pakistan J. Med. Sci.* **36**, S27 (2020)
- Mumtaz, N., Saqulain, G., Mumtaz, N.: Online academics in Pakistan: COVID-19 and beyond. *Pakistan J. Med. Sci.* **37**(1), 283 (2021)
- Murphy, M.P.: COVID-19 and emergency eLearning: Consequences of the securitization of higher education for post-pandemic pedagogy. *Contemp. Sec. Policy* **41**(3), 492–505 (2020)
- Muthuprasad, T., Aiswarya, S., Aditya, K., Jha, G.K.: Students' perception and preference for online education in India during COVID-19 pandemic. *Soc. Sci. Human. Open* **3**(1), 100101 (2021)
- Onyema, E.M., Eucheria, N.C., Obafemi, F.A., Sen, S., Atonye, F.G., Sharma, A., Alsayed, A.O.: Impact of Coronavirus pandemic on education. *J. Educ. Pract.* **11**(13), 108–121 (2020)
- Pearce, N., Weller, M., Scanlon, E., & Kinsley, S.: Digital scholarship considered: How new technologies could transform academic work. *Education* **16**(1)Spring 2010, 33–44 (2010).
- Quimno, V., Imran, A., & Turner, T.: Introducing a sociomaterial perspective to investigate e-learning for higher educational institutions in developing countries. *ACIS 2013: Information Systems: Transforming the Future: Proceedings of the 24th Australasian Conference on Information Systems*, 1–12 (2013). https://researchrepository.rmit.edu.au/discovery/fulldisplay/alma9921861133701341/61RMIT_INST:ResearchRepository.
- Rahiem, M.D.: Remaining motivated despite the limitations: University students' learning propensity during the COVID-19 pandemic. *Child Youth Serv. Rev.* **120**, 105802 (2021)
- Rasheed, R., Rizwan, A., Javed, H., Sharif, F., Zaidi, A.: Socio-economic and environmental impacts of COVID-19 pandemic in Pakistan—an integrated analysis. *Environ. Sci. Pollut. Res.* **28**, 19926 (2021)
- Rizun, M., Strzelecki, A.: Students' acceptance of the Covid-19 impact on shifting higher education to distance learning in Poland. *Int. J. Environ. Res. Public Health* **17**(18), 6468 (2020)
- Sá, M.J., Serpa, S.: The global crisis brought about by SARS-CoV-2 and its impacts on education: an overview of the Portuguese panorama. *Sci Insign Edu Front* **5**(2), 525–530 (2020)

- Salloum, S.A., Al-Emran, M., Shaalan, K., Tarhini, A.: Factors affecting the e-learning acceptance: a case study from UAE. *Educ. Inf. Technol.* **24**(1), 509–530 (2019)
- Samsudeen, S.N., Mohamed, R.: University students' intention to use e-learning systems. *Inter. Technol. Smart Educ.* **16**, 219 (2019)
- Santos, H., Batista, J., Marques, R.P.: Digital transformation in higher education: the use of communication technologies by students. *Proced. Comput. Sci.* **164**, 123–130 (2019)
- Sheerman, L., Marston, H.R., Musselwhite, C., Morgan, D.: COVID-19 and the secret virtual assistants: the social weapons for a state of emergency. *Emerald Open Res.* **2**(19), 19 (2020)
- Shoaib, M., Abdullah, F.: Risk reduction of COVID-19 pandemic in Pakistan. *Soc. Work Public Health* **35**(7), 557–568 (2020)
- Shoaib, M., & Abdullah, F.: COVID-19 backlash: psycho-social impacts of outbreak in Pakistan. *Health Educ.* **121**(3), 265–274 (2021). <https://doi.org/10.1108/HE-07-2020-0047>.
- Sife, A., Lwoga, E., Sanga, C.: New technologies for teaching and learning: challenges for higher learning institutions in developing countries. *Int. J. Educ. Develop. ICT* **3**(2), 57–67 (2007)
- Simamora, R.M.: The challenges of online learning during the COVID-19 pandemic: an essay analysis of performing arts education students. *Stud. Learn. Teach.* **1**(2), 86–103 (2020)
- Tadesse, S., Muluye, W.: The impact of COVID-19 pandemic on education system in developing countries: a review. *Open J. Soc. Sci.* **8**(10), 159–170 (2020)
- Tang, W., Hu, T., Yang, L., Xu, J.: The role of alexithymia in the mental health problems of home-quarantined university students during the COVID-19 pandemic in China. *Person. Individ. Differ.* **165**, 110131 (2020)
- Tanveer, M., Bhaumik, A., Hassan, S., UIHaq, I.: Covid-19 pandemic, outbreak educational sector and students online learning in Saudi Arabia. *J. Entrep. Educ.* **23**(3), 1–14 (2020)
- TI, S. K.: Response analysis, challenges & strategic vision for pakistan amidst the COVID-19 crisis. *On August*, 21 (2020).
- Volchik, V., Maslyukova, E.: Performance and sustainability of higher education: key indicators versus academic values. *J. Sec. Sustain. Issues* **6**(3), 501–512 (2017)
- Wang, C., Zhao, H.: The impact of COVID-19 on anxiety in Chinese university students. *Front. Psychol.* **11**, 1168 (2020)
- Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., Sasangohar, F.: Investigating mental health of US college students during the COVID-19 pandemic: cross-sectional survey study. *J. Med. Internet Res.* **22**(9), e22817 (2020)
- Wargadinata, W., Maimunah, I., Eva, D., Rofiq, Z.: Student's responses on learning in the early COVID-19 pandemic. *Tadris J. Educ. Teacher Train.* **5**(1), 141–153 (2020)
- Xiao, J.: Digital transformation in higher education: critiquing the 5-year development plans (2016–2020) of 75 Chinese universities. *Distance Educ.* **40**(4), 515–533 (2019)
- Zai, S.A.Y., Akhuzada, A.S.: Challenges and responses of higher education institutions to align higher education with COVID-19 realities: a thematic analysis. *Int. J. Dist. Edu. E-Learn.* **6**(1), 109–129 (2020)