**Problems and prospects of blended learning; Insights from the COVID-19 pandemic**

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**Abstract**

As the world is affected by a pandemic disease, higher education institutions attempt to provide more flexibility in higher education through digitalisation and online and blended learning designs. During the COVID-19 pandemic, the government of India also supported several proposals for secondary and higher education through the MoE. Students used popular social media platforms such as Teachmint, Zoom, WebEx, Google Meet, YouTube and others as online teaching - learning tools during the lockdown. However, e-learning is still a barrier for several rural and remote areas. They suffer major problems like limited access to proper devices, lack of digital illiteracy, deficiency of infrastructural support, domestic and financial issues, health and mental issues, stress and poor data connectivity. Henceforth, blended learning will become more important as it is considered equally effective as traditional classroom learning and spends less time in the classroom.

**Keywords:** Blended learning, digitalisation of education, innovations, COVID-19 pandemic

**Introduction**

In the near history, the COVID-19 pandemic has historically devastated the education systems on every continent worldwide. Nearly 1.6 billion pupils across more than 190 nations face the curse of the pandemic in providing a proper education. 94% of the global student population has been affected by school closures, with up to 99% in low and middle-income countries (United Nations, 2020). The shutdown of educational institutions has impacted many pupils, even though the lockdown and social isolation are the only means to halt the spread of COVID-19 by breaking the chain of transmission. As schools, colleges, and universities were forced to close indefinitely, educational institutions and students experimented with various teaching-learning strategies in order to complete their mandated curricula within the time frames specified by the academic calendar.

With the spread of the COVID-19 pandemic, there is a growing trend toward online teaching as the only remaining alternative to closing schools, colleges and institutions indefinitely (Martinez, 2020). Therefore, this is the apt time to seriously reconsider, overhaul, and redesign our educational system, which is needed sorely due to the unprecedented situation. Non-formal education includes e-learning, distance education, and correspondence courses, but if current trends continue, it appears that it will eventually supplant the formal education system. Now the trend is to create more and more new online platforms that would alter the entire scenario of the whole education system, and most universities and other institutions have shifted to the online world using WhatsApp, Teachmint, Microsoft Teams, Zoom, Webex, Google Meet, Google Classroom, Telegram, YouTube Live, Facebook Live and many more.

Even though teachers and students were familiar with modern internet-based learning practices, the abrupt formalisation of e-learning created many issues for both learners and teachers. Online-based learning was created to address stagnation in the current educational system but has raised concerns about the quality of education due to its problems (Shahriar et al., 2021).

The advent of online and distance learning (ODL) in the past ten years has opened up the possibility of adaptable, boundary-less classrooms and campuses (Dash, 2019). In the Open and Distance Learning scenario, the challenges are providing technological infrastructure and mentoring and guidance on using digital resources to interact with teachers and colleagues anywhere, at any time (Xiao et al., 2019).

Under a comprehensive reform recommended by the UGC, EdTech companies will be allowed to cooperate with higher education institutions that offer online UG and PG degrees to help develop course content and assess students (Barman, 2022). Digital University is one of the most talked-about and popular initiatives of the union government. It envisions the mission of making higher education accessible to all. Digital universities will solve the seat shortage problem by providing unlimited seats for everyone (Pandey, 2022).

The main purpose of digital pedagogy is to use digital resources as educational tools to support and enable students to manage their learning (Sneed, 2016). Since the COVID-19 pandemic has made the use of online assessments mandatory, the need for teachers to implement digital taxonomy techniques, such as Bloom's Digital Taxonomy, has increased even further (Matore, 2021). Bloom’s Digital Taxonomy (BDT) graphical representation is in Fig.1.

**Fig.1**

*Mind map of Bloom’s Revised Digital Taxonomy (adopted from Churches, 2008)*

Diagram

Description automatically generated

"Digital verbs" are defined by Nikolic and Dabic (2016) as "verbs" that are used in digital environments differently because of their academic practice. The main components of many of the digital activities suggested in BDT are editing, creating, sharing, and interacting (Cardoso, 2019 According to Lightle (2011), BDT facilitates decision-making regarding educational opportunities by allowing us to navigate the extensive array of digital tools. Nevertheless, there are two disadvantages to employing digital verbs in academic writing. First, classifying digital tools and assigning them to the right level is difficult as the tools cannot be confined to attending to any one task. Second, the tools’ popularity varies depending on the circumstances (Hart, 2015).

The nomenclature and hierarchy of levels of the digital taxonomy are from Bloom’s revised taxonomy (Anderson & Krathwohl, 2001). Collaboration is a distinct element, as some elements are shared. In the teaching-learning process, collaboration is currently regarded as a 21st-century skill that is becoming more and more important. In certain contexts, it is a component of Bloom's taxonomy, while in others, it is merely a tool that supports higher-order thinking and learning. According to Amin and Mirza (2020), the implementation of BDT in curriculum, instructions, and assessments for educators could encourage both traditional and online higher education institutions to embrace digital pedagogy for teaching purposes, even though students in the digital age are already heavily reliant on digital tools.

**Education through blended learning**

‘Blended Learning’ is mostly used interchangeably with hybrid, mixed-mode, or flexible learning. In this digitalised society, online technologies are primarily used for virtual, synchronous and asynchronous learning, whereas blended learning connotes a combination of online and face-to-face classroom training (Muller & Mildenberger, 2021). Any academic interference or rehabilitation technique that associates proper teaching - learning strategies that uses technologies or online resources to enable dynamic learning experiences and the achievement of educational goals is named blended learning (Mirriahi et al., 2015). Blended learning systems combine classroom instruction with computer-based instruction with online learning experiences (Graham, 2006; Garrison & Kanuka, 2004); and since all universities currently use online teaching management systems through which at least teaching-learning materials are made available; blended learning is now considered as ‘new traditional model’ (Dziuban et al., 2018).

The flipped classroom is quite a simple strategy for delivering learning resources such as articles, pre‑recorded videos and YouTube links before starting a lesson (Pokhrel and Chhetri, 2021). Afterwards, online classroom time is used to enhance comprehension through conversation with peers and teachers. It also highlights the fact that various subjects and age groups call for various approaches to e-learning (Doucet et al., 2020). During the lockdown, Government of India took several initiatives with the support of MHRD (Ministry of Human Resource Development), renamed MoE (Ministry of Education) in August 2020, to not hamper the academic activities of schools, colleges and universities. DIKSHA, e-Pathshala and the National Repository of Open Educational Resources (NROER) are digital initiatives for secondary education, whereas Swayam, Swayam Prabha and e-PG Pathshala are for higher education.

A nationwide platform for the NCERT's school education initiative is called Digital Infrastructure for Knowledge Sharing (DIKSHA) (<https://diksha.gov.in> or <https://www.india.gov.in/spotlight/se-shagun-school-education-shagun>). This portal offers textbooks, worksheets, assessments, video lectures, and other curriculum-aligned e-learning materials for parents, teachers, and students.

The NCERT e-learning programme, e-Pathshala (http://epathshala.gov.in or http://epathshala.nic.in), offers multiple language versions of standards 1 to 12. The portal includes books, audio files, videos, and other resources in Hindi, Urdu, and English that are intended for parents, teachers, and students.

The government of India launched the SWAYAM programme (https://swayam.gov.in/), which aims to implement the three fundamental tenets of education policy: quality, equity, and access. The goal of this endeavour is to provide everyone, including the underprivileged, with access to the best teaching-learning tools. SWAYAM aims to close the digital gap for students who were untouched by the digital revolution and were unable to integrate themselves into the knowledge-based economy.

SWAYAM PRABHA (<https://www.swayamprabha.gov.in/>) is a 34 DTH channel broadcasting 24/7 high-quality educational programming via the GSAT-15 satellite. Students can select the time that works best for them, with at least four hours of new content repeated five additional times a day. The website is maintained by the INFLIBNET Center.

The MoE (previously MHRD) launched the e-PG Pathshala (https://epgp.inflibnet.ac.in/) as a component of their National Mission on Education through ICT (NME-ICT), which is being carried out by the UGC. Curriculum-based, interactive e-contents are created by subject experts at Indian universities and other research and development institutes nationwide in almost all disciplines, including the social sciences, arts, fine arts, humanities, science, mathematics, linguistics, and languages. Each subject was assigned to a principal investigator, a work coordinator, content writers, language editors, reviewers, and a multimedia team.

According to some research on online education, the majority of students choose to learn online via smartphones and prefer recorded lessons with post-class quizzes to increase the efficacy of their education (Muthuprasad et al., 2021; Mishra et al., 2020).

**The positive impact of the COVID-19 pandemic on education**

During the pandemic, the education system got an opportunity to transform from a traditional system to a digitalised one. The use of online platforms has improved significantly. The pandemic has led to a massive increase in teleconferencing, virtual meetings, webinars, and e-conferencing opportunities. People had to learn and use digital technologies, which finally led to an increase in digital literacy. Most students prefer Open and Distance Learning as it motivates self-learning, offers chances to learn from diverse resources and adapts learning according to their requirements (Jena, 2020). The most important factor is that the traditional method of the teaching-learning system was replaced by blended learning. Educators in schools, colleges, and universities adopt the blended learning approach. There is a big possibility that the face-to-face teaching-learning process and online modules will become ‘the new normal’ (Dziuban et al., 2018). Teachers had to adapt quickly to technology and be ready for this learning method.

As blended learning is the future learning format, there will be new ways of designing and delivering high-quality content, especially given that the use of learning management systems will lead to greater openness and transparency in academia. Since blended learning employs an innovative approach to the delivery and assessment of learning outcomes, it can also present opportunities for curriculum development and pedagogy. Additionally, it presents a chance for curriculum designers to raise the standard of the instructional materials.

According to Rajab et al. (2020), hurdles to online medical education during COVID-19 included issues concerning communication problems (59%), student assessments (57.5%), technology-based tool use (56.5 %), the online experience (55%), pandemic-related anxiety or stress (48 %), time management (35 %), and technophobia (17%).

**The negative impact of the COVID-19 pandemic on education**

Even though online education signatures the concept of ‘education for all,’ students in rural areas proved that e-learning is not for all (Reddy & Ramesh, 2020). It is important to see the accessibility of accurate devices for each student to avail of the digital content. The COVID-19 pandemic has posed many issues for school administrators. Schools, particularly in rural areas, face financial impact and the digital divide challenges. Conducting online classes in a rural area poses certain challenges, and many students who do not have gadgets like smartphones or internet access are left out (Dube, 2020; Jena, 2020). Students in rural and remote areas face challenges accessing their online courses due to inadequate internet connectivity, a shortage of computers and smartphones, and power issues (Naik & Rao, 2020).

Also, the data packages and their prices discourage both teachers and students from continuing with live classes. Another key factor for the further development of digital education is the insufficient competence of rural teachers to operate digital platforms. The lack of training to use digital platforms makes teachers reluctant to adopt these teaching methods. Civil society organisations, legislators, and the government must work together to establish a user-friendly digital interface that enables teachers and students to learn without interruption.

Digital illiteracy and lack of infrastructural support are the main issues encountered in rural or remote areas. A large section of the rural populace still lacks access to the internet and the ability to recognise devices and digital terminologies. Another major problem concerns the lack of supporting infrastructure facilities such as a stable flow of electricity and the unavailability of high-speed internet.

Since majority of students unable to access a computer/laptop or supportive mobile phone and many may have limited or no internet connection, online teaching and learning can lead to a digital divide among students. According to various reports, the lockdown has disproportionately harmed underprivileged pupils in India, who cannot access online learning. Therefore, the online learning may widen the gap between rich/poor and urban/rural during the COVID-19 pandemic. Students lost an academic year as a result of the lockdown, exacerbating the lack of educational continuity. Students would face great difficulties returning to school after a large gap, and thus continuity in educational activity may get hampered (Jena, 2020).

The rapid transition of all teachers and students from traditional to online learning was a major crisis. Proper orientation classes to organise online classes were absent, students and teachers lacked technical knowledge, and the beginning of online teaching and learning was very difficult. Without a dedicated platform, most lecturers conduct lectures via Zoom, Google Meet, and others, which may not represent true online learning. Later, online teaching became familiar to all, and sharing materials like PPTs, PDFs, teaching notes, etc., made the online sessions more enriching.

During the lockdown, most parents got unemployed. They found it difficult to pay the fees of their wards for that period, which harmed private institutions in the wake of the COVID-19 outbreak, forcing school closures and a shift to online classes; the Honourable Supreme Court has ruled that educational institutions must reduce fees as their overhead costs have reduced, as various on-campus facilities have remained closed. Educational administrators should be aware of the challenges individuals face due to the pandemic and support the students and their parents during these difficult times. It found that requesting payment for services not rendered to students is profiteering, and institutions must avoid such practices (Choudhary, 2021).

Chakraborty et al. (2020) studied Students’ opinions on online education during the pandemic and reported that they thought that students learned improved in physical classrooms (65.9 percent) and by attending Massive Open Online Courses (MOOCs) (39.9 percent). On the other hand, students believe that professors’ online teaching skills have improved since the pandemic (68.1%) and that online education is beneficial (77.9 %). The software and online teaching-learning materials that enabled online education were well received by the students. Students, on the other hand, believe that online classes are stressful and that they have an impact on their physical and mental health as well as their social lives.

**Innovations in online learning in the new normal era**

A fundamental component of educational innovation is educator training and student and educator learning (Wadmany & Melamed, 2018). Students' interest in the learning process can also be increased through the usage of innovative media since it creates a more effective and efficient learning atmosphere process (Islam et al., 2018). Innovations in teaching-learning media in education are increasing and there is a paradigm shift in learning that requires the role and technological sophistication of knowledge transfer without affecting individual mobility (Zamroni et al., 2020; Rozi et al., 2020). To improve interactive, effective, efficient and cost-effective learning models in the 21st century, innovative educators may have the opportunity to combine face-to-face and digital learning methods (Pavlik, 2015). Innovative media focuses on the teaching-learning process, creatively and dynamically designed, developed and managed through the application of a multi-directional approach to improvement and the latest media are used to create an atmosphere and learning process that is conducive to the students (Bali et al., 2021).

Massive Open Online Courses (MOOCs) have developed as a new method of disseminating educational content to a large audience, but they have so far been unable to keep students' interest for an extended period (Davis et al., 2018). Utilising adaptive learning strategies, online learning platforms personalise each student's learning process (Li et al., 2021). These systems use data analysis and algorithms to identify learners' strengths and weaknesses and adjust course material accordingly. The innovation of Virtual Reality (VR) and Augmented Reality (AR) technologies have been increasingly used to create immersive learning experiences. These technologies allow students to explore virtual environments, manipulate objects, and participate in simulations, encouraging a more interactive and hands-on approach to learning (Baabdullah et al., 2022). With the widespread use of smartphones and tablets, mobile learning has become a prominent trend. Learning materials are optimised for mobile devices, allowing learners can access learning content anytime, anywhere, making learning more accessible and flexible (Criollo-C et al., 2021). AI-powered tools are used to enhance online learning experiences. Intelligent tutoring systems can provide learners with personalised feedback and guidance, while AI algorithms can analyse vast amounts of data to improve learning outcomes and recommend customised learning paths (Kuleto et al., 2021). Artificial Intelligence (AI) has made Learning Management Systems (LMSs) more flexible and able to customize assignments for each student. These customizations improve the feasibility of the modules by tailoring them to the individual abilities, inclinations and needs of each student (Laxmaiah et al., 2022).

‘New Normal’ is the step to accelerate the teaching-learning process during the pandemic. It must be possible to combine face-to-face and virtual learning methods, as face-to-face classes are not overcrowded as usual and teachers therefore need to be creative and innovative to be able to use the short face-to-face time effectively and efficiently.

**Educational research during the COVID-19 pandemic**

Many difficulties arose at the school level and in the research fields during the pandemic. Many exams like UGC-NET, CSIR-NET, and GATE were postponed. Many universities failed to complete PhD and MPhil courses on time, and the universities extended the duration to six months following the recommendation of UGC. But the fellowships have not been extended in proportion to that. They could not find other employment or financial resources. Thus, universities and the government failed to do justice to the researchers. During the lockdown, researchers were devoid of the hostel and other facilities available at the universities and university-affiliated research centres; this was a major blow to further research.

Although the lockdown did not significantly affect research in subjects like the Arts and Humanities, it significantly impacted practical subjects like Life Sciences. Due to the absence of appropriate monitoring of laboratory experiments on the required topics, they relied on online platforms for other research discussions. Research in Arts subjects has largely relied on online platforms such as Google Forms, Google Meet, and WhatsApp for data collection. However, this is not practical for Life Sciences as they always need to conduct experimental research. As a result, research in the Life Sciences has almost come to a near standstill. Moreover, the researchers who lost time and money on experiments must find funds to resume these research activities. This situation also hinders the progress of further research.

Although seminars, symposiums, and conferences shifted to an online platform, engaging the attendees throughout the entire programme was not easy. The significant thing to be noted is that various seminars were held almost simultaneously in many colleges and universities during the said period. The pertinent issue was that in such seminars, participants were to do the paper presentation only during the allotted time, making attending other technical sessions an option. Those interested in attending seminars easily participated in many at a sitting by just switching over to various online platforms the organisers were using; the participants received a good collection of certificates; but whether these seminars served their real purpose remains unanswered.

**Conclusion**

In India, taking education to every nuke and corner of the nation via digital platforms is not an easy task. The priority should be to leverage digital technology to create advantageous positions for millions of young students in India. The urgency is the betterment of millions of young Indian students with digital technologies. Educational institutions must enhance their knowledge and information technology infrastructure and prepare for COVID-19-like situations.

The concept of ‘work-from-home’ has more relevance in such pandemic situations to reduce the spread of the disease, and at the same time, it need not compromise the spread of education. To ensure adequate education, India needs a policy to engage diverse people from different backgrounds, including remote regions, the marginalised and minority groups. In the case of research scholars, the universities and allied research institutes must provide financial support to researchers for the smooth running of their research. Since online practice benefits students immensely, it may be recommended long after the pandemic. The curriculum should be redesigned based on Bloom’s Digital Taxonomy and implemented to achieve the academic and educational purposes of the digital era. In conclusion, various studies have implied that blended learning is neither more nor less effective than traditional classroom learning.

**References**

Amin, H., & Mirza, M.S. (2020). Comparative study of knowledge and use of Bloom’s digital taxonomy by teachers and students in virtual and conventional universities. *Asian Association of Open Universities Journal*, *15*(2), 223-238. <https://doi.org/10.1108/AAOUJ-01-2020-0005>

Anderson, L.W., & Krathwohl, D.R. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives*. Allyn & Bacon. Boston, MA (Pearson Education Group).

Baabdullah, A. M., Alsulaimani, A. A., Allamnakhrah, A., Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. (2022). Usage of augmented reality (AR) and development of e-learning outcomes: An empirical evaluation of students’e-learning experience. *Computers & Education*, *177*, 104383. <https://doi.org/10.1016/j.compedu.2021.104383>

Bali, M. M. E. I., Baharun, H., Madanibillah, A., Muali, C., Lukman, N. K. A., & Bon, A. T. (2021). Innovative learning media based on e-learning in the new normal era. *Proceedings of the 11th Annual International Conference on Industrial Engineering and Operations Management*, 6987-6993.

Cardoso, S. (2019). New technologies and new literacies in the English classroom: a study. *Revista Intersaberes*, *14*(3), 1168-186. <https://doi.org/10.22169/ri.v14i31.1523>

Chakraborty, P, Mittal, P., Gupta, M.S., Yadav, S., & Arora, A. (2021). Opinion of students on online education during the COVID-19 pandemic. *Human Behaviour and Emerging Technologies*, *3*(3), 357–365. <https://doi.org/10.1002/hbe2.240>

Choudhary, A.A. (2021). *Schools must reduce fees for online-only classes: Supreme Court*. Available at: <https://timesofindia.indiatimes.com/india/schools-must-reduce-fees-for-online-only-classes-supreme-court/articleshow/82377796.cms>

Churches, A. (2008). *Bloom’s digital taxonomy*, pp.1–44. Available: <http://burtonslifelearning.pbworks.com/f/BloomDigitalTaxonomy2001.pdf>.

Criollo-C, S., Guerrero-Arias, A., Jaramillo-Alcázar, Á., & Luján-Mora, S. (2021). Mobile learning technologies for education: Benefits and pending issues. *Applied Sciences*, *11*(9), 4111. <https://doi.org/10.3390/app11094111>

Dash, BM (2019). Perception towards quality and effectiveness of social work education through open and distance learning, *Asian Association of Open Universities Journal*, *14*(1), 64-83. <https://doi.org/10.1108/AAOUJ-06-2019-0023>

Davis, D., Chen, G., Hauff, C., & Houben, G. J. (2018). Activating learning at scale: A review of innovations in online learning strategies. *Computers & Education*, *125*, 327-344. <https://doi.org/10.1016/j.compedu.2018.05.019>

Doucet, A., Netolicky, D., Timmers, K., & Tuscano, F. J. (2020). *Thinking about pedagogy in an unfolding pandemic (An Independent Report on Approaches to Distance Learning during COVID-19 School Closure)*. Work of Education International and UNESCO. <https://issuu.com/educationinternational/docs/2020_research_covid-19_eng>

Dube, B. (2020). Rural online learning in the context of COVID 19 in South Africa: Evoking an inclusive education approach. *REMIE: Multidisciplinary Journal of Educational Research*, *10*(2), 135-157.

Dziuban, C., Graham, C.R., Moskal, P.D., Norberg, A., & Sicilia, N. (2018). Blended learning: The new normal and emerging technologies. *International Journal of Educational Technology in Higher Education*, *15*(3), 1-16. <https://doi.org/10.1186/s41239-017-0087-5>

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95-105. <https://doi.org/10.1016/j.iheduc.2004.02.001>

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk, & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco: Wiley & Sons.

Hart, J. (2015). Top 100 Tools for 2015. *Preuzeto 2016 Sa Top 100 Tools for Learning*. available at: <http://c4lpt.co.uk/top100tools/>

Islam, S., Baharun, H., Muali, C., Ghufron, M. I., Bali, M. M. E. I., Wijaya, M., & Marzuki, I. (2018). To Boost Students’ Motivation and Achievement through Blended Learning. *Journal of Physics: Conference Series*, *1114*(1), 1–11. <https://doi.org/10.1088/1742-6596/1114/1/012046>

Jena, P. K. (2020). Impact of pandemic COVID-19 on education in India. *International journal of current research*, *12*(7), 12582-12586. <https://doi.org/10.24941/ijcr.39209.07.2020>

Kuleto, V., Ilić, M., Dumangiu, M., Ranković, M., Martins, O. M., Păun, D., & Mihoreanu, L. (2021). Exploring opportunities and challenges of artificial intelligence and machine learning in higher education institutions. *Sustainability*, *13*(18), 10424. <https://doi.org/10.3390/su131810424>

Laxmaiah, B., Ramji, B., & Kiran, A. U. (2022). Intelligent and adaptive learning management system technology (LMST) using data mining and artificial intelligence. *ICCCE 2021: Proceedings of the 4th International Conference on Communications and Cyber Physical Engineering*, pp. 333-341. <https://doi.org/10.1007/978-981-16-7985-8_35>

Li, F., He, Y., & Xue, Q. (2021). Progress, challenges and countermeasures of adaptive learning. Educational Technology & Society, 24(3), 238-255. <https://www.jstor.org/stable/27032868>

Lightle, K. (2011). More than just the technology, *Science Scope*, Vol. 34, No. 9, pp. 6-9.

Martinez, J. (2020). *Take this pandemic moment to improve education*. EduSource. Retrieved from [https://edsource.org/2020/take-this-pandemic-moment-to-improve- education/633500](https://edsource.org/2020/take-this-pandemic-moment-to-improve-%20education/633500)

Matore, MEEM (2021). Rasch Model Assessment for Bloom Digital Taxonomy Applications. *Computers, Materials and Continua*, *68*(1), 1235-1253. <https://doi.org/10.32604/cmc.2021.016143>

Mirriahi, N., Alonzo, D. & Fox, B. (2015). A blended learning framework for curriculum design and professional development, *Research in Learning Technology*, *23*, 1-14. <https://doi.org/10.3402/rlt.v23.28451>

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, *1*(100012), 1-8. <https://doi.org/10.1016/j.ijedro.2020.100012>

Müller, C., & Mildenberger, T. (2021). Facilitating flexible learning by replacing classroom time with an online learning environment: A systematic review of blended learning in higher education. *Educational Research Review*, *34*(100394), 1-16. <https://doi.org/10.1016/j.edurev.2021.100394>

Muthuprasad, T., Aiswarya, S., Aditya, K. S., & Jha, G. K. (2021). Students’ perception and preference for online education in India during COVID-19 pandemic. *Social Sciences and Humanities Open*, *3*(1), 1-11. <https://doi.org/10.1016/j.ssaho.2020.100101>

Naik, G., & Rao, K. N. N. (2020). *Challenges of online education in Rural Karnataka*. Available at: <https://www.forbesindia.com/article/iim-bangalore/challenges-of-online-education-in-rural-karnataka/62349/1>

Nikolic, M., & Dabic, T. (2016). The Bloom’s taxonomy revisited in the context of online tools. *Sinteza 2016-International Scientific Conference on ICT and E-Business Related Research*. <https://doi.org/10.15308/Sinteza-2016-315-320>

Pavlik, J. V. (2015). Fueling a Third Paradigm of Education: The Pedagogical Implications of Digital, Social and Mobile Media. *Contemporary Educational Technology*, *6*(2), 113–125. <https://doi.org/10.30935/cedtech/6143>

Pokhrel, S., & Chhetri, R. (2021). A literature review on impact of COVID-19 pandemic on teaching and learning. *Higher Education for the Future*, *8*(1), 133-141. <https://doi.org/10.1177%2F2347631120983481>

Rajab, M.H., Gazal, A.M, & Alkattan, K. (2020). Challenges to Online Medical Education During the COVID-19 Pandemic. *Cureus*, *12*(7), 1-8. <https://doi.org/10.7759/cureus.8966>

Reddy, D.S., & Ramesh, LSRCV (2020). Pros and cons of e-learning by children in rural areas during lockdown situation and ways to empower it. *International Journal of Innovative Technology and Research*, 7-9.

Rozi, F., El Iq Bali, M. M., Firdaus, S., Wijaya, M., Al Mursyidi, R. A., Haqiki, M. W., & Abidin, Z. (2020). Learning management; identifying learning styles of language learners in madrasah. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, 3783–3790.

Shahriar, S.H.B., Arafat, S., Sultana, N., Akter, S., Khan, M.M.R., Nur, J.E.H. & Khan, S.I. (2021). The transformation of education during the corona pandemic: exploring the perspective of the private university students in Bangladesh. *Asian Association of Open Universities Journal*, *16*(2), 161-176.

Sneed, O. (2016), *Integrating technology with Bloom’s taxonomy*, available at: <https://teachonline.asu.edu/2016/05/integrating-technology-blooms-taxonomy/>

United Nations (2020). *Policy brief: education during covid-19 and beyond*, pp. 1-26. <https://www.un.org/development/desa/dspd/wpcontent/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf>

Wadmany, R., & Melamed, O. (2018). “New Media in Education” MOOC: Improving Peer Assessments of Students’ Plans and their Innovativeness. *Journal of Education and E-Learning Research*, *5*(2), 122–130. <https://doi.org/10.20448/journal.509.2018.52.122.130>

Xiao, J., Sun-Lin, H. Z., & Cheng, H.C. (2019). A framework of online-merge-offline (OMO) classroom for open education. *Asian Association of Open Universities Journal*, *14*(2), 134-146. <https://doi.org/10.1108/AAOUJ-08-2019-0033>

Zamroni, Ilyasin, M., & Tohet, M. (2020). Multicultural education in a religious life: Developing harmony among religions in southeast Asia. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, 3791–3801.