



Blended Learning - A Global Solution in the Age of COVID-19

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Authors' contributions

All authors have equally participated in the planning, designing and conceptualizing the final draft of the article. Author BD designed the study, performed the article analysis, and wrote the first draft of the manuscript. Author CS and Author NL conceptualize the article and help in literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: The World Health Organization (WHO) has recently declared Covid 19 to be a pandemic that poses a threat to humanity. The existing Conventional and other instructional methods have been canceled and the online learning has been broadly revised to allow learners to educate themselves through online platforms.

Aims: This article was written to identify the teaching practices throughout Covid 19 with key terms, virtual mastering during the lockdown, on-line teaching during a pandemic, and application of blended learning during Covid-19 and post Covid implication.

Methodology: The mini review was conducted to identify the online teaching practices during Covid-19 and blended mode of teaching in higher education and its implication during post Covid-19. The different database searches identified more than ninety articles, of which 35 full-textual content articles had been assessed and nineteen had been included in this paper.

Results: Blended learning is a modern, powerful, and effective tool for increasing universities' competitiveness, meeting the diverse needs and interests of instructional service consumers,

imposing the concept of continuing education, and integrating classroom and distance learning to facilitate independent, interactive, and collaborative learning among students.

Conclusion: The article finishes with an overview of the most pressing issues, as well as suggestions and brief recommendations for expanding the use of blended learning in the post-Covid-19 era.

Keywords: Covid-19; blended learning; online teaching; distance learning, emergency remote teaching; learning platforms.

1. INTRODUCTION

According to Huang et al. a novel corona virus, called Covid-19, was discovered within the last month of the year 2019, in a sea food market in Wuhan [1]. The virus's clinical study revealed that it was spread from person to person [2]. The Director General of World Health Organization in March 2020 declared Covid-19 as a pandemic after assessment of the rapid spread and severity of the deadly virus across the globe with additional announcement of social distancing as a method of curbing the unfold of the pandemic [3]. Subsequently, to contain the COVID-19, the Chinese government has banned most-face-to-face activities, together with teaching. Due to the threat of COVID-19, schools, colleges and universities face choices concerning decisions about the way to continue teaching and learning whereas keeping their students, staff and faculty safe from a public health emergency that is moving quick and not well understood [2,3].

Many institutions have opted to cancel all face-to-face classes, together with labs and other learning experiences, and have mandated that school move their courses on-line to prevent the spread of the virus that causes COVID-19. The list of institutions of higher education creating this call has been growing day after day. Institutions of all sizes and types are moving their classes online [4]. The Chinese Ministry of Education has released an initiative entitled Disrupted Classes, Undisrupted Learning to offer flexible on-line learning to hundreds of millions college students from their homes [1]. A previous analysis undertaken by the author has revealed that students tend to have a strong bonding with Information and Communication Technologies. These conspicuous perceptions and the massive lockdown within the midst of present day COVID-19 pandemic furnished the intrinsic motivation for this study [5].

As concerns about the spread of COVID-19 and calls to contain the Corona Virus mount, an increasing number of educational institutions

throughout the world are abandoning face-to-face classes. The Corona virus has revealed rising vulnerabilities in education systems round the world. It is presently clear that society desires flexible and resilient schooling structures as future is unpredictable [6].

Following the outbreak of COVID 19 in February 2020, Indian universities were closed down, and students have been taught through digital platforms ever then. For the first time in Indian education history, there has been a change from a face-to-face teaching paradigm to one that is entirely online. Digital media is being used extensively [7].

Teachers across the section of the society have had to quickly get accustomed to the web way of teaching, which has pushed them toward a digital mindset. The student community is also severely impacted. They've had to give up their social lives on campus, stay indoors, and take online classes [8]. According to several studies, students who learn online are marginally more receptive than students who "prefer to learn in a traditional face-to-face situation." However, another study found that the mixed teaching method produces the best results. It's important to have a contingency plan to fully address these urgent issues, especially in the areas where access to the Internet is a problem or with limited internet connectivity. In these situations, face-to-face learning is the only viable alternative [9].

According to UNESCO [10], this decision has affected a minimum of 1,268,164,088 students from 177 countries, or 72.4 percent. However, those numbers no longer include school teachers, educators, trainers, and other educational personnel. Though students and educators were dissatisfied with the closure of their schools or institutions, they had no choice but to unwaveringly support the decision to protect themselves and their families.

Great efforts are underway in several countries to keep schools as open and operational as

possible. With most countries suddenly leaving the classroom, some wonder if the acceptance of online learning will continue after the pandemic, and how this shift will affect the world's school industry [11].

The education system within the 21st century is directly associated with information technologies, which are rapidly developing. Their dissemination needs the tutorial system to adapt to the new reality, resolve imperative problems, and develop new strategies and forms of education. Before the COVID-19 pandemic there have been already increasingly positive developments in digital learning and teaching. There was already heaps of proof in basic research that could highlight the benefits of the targeted use of digital teaching. In unique blended learning concepts including the Inverted Classroom Model, however additionally the usages of but virtual patients and simulations have been more and more used. However, there have been relevant hurdles that delayed digital teaching [11,12].

Many people's perceptions of schooling have shifted due to COVID-19 pandemic. As a result, schooling has undergone significant transformations, particularly with the emergence of e-learning, in which instruction is done remotely and on virtual platforms. According to study, online learning has been shown to improve data retention and require less time [9]. While some believe that an unplanned and hasty transition to online learning with no training, insufficient bandwidth, and little preparation can result in poor user expertise that is detrimental to long-term growth, others believe that a replacement hybrid model of education can emerge with significant benefits [9, 12, 13, 14].

In Taiwan, Cheng et al. [15] conducted an experimental study to see how satisfied students were with the distant learning system. The study's findings revealed that student happiness with the remote learning system has a significant impact on their performance, whereas learning styles had little impact on student satisfaction with the distance learning system. Institutions are required to make appropriate and timely changes in order to deliver education and maintain student academic development under the terms of the COVID-19 policy. The teaching and learning activities were immediately switched to a comprehensive E-learning environment. Previous research has shown that some e-learning and online learning tools are effective for teaching

and learning in the healthcare professional field [16].

Existing strategies that use classroom delivery in the traditional teaching and learning mode compared to the online environment are problematic in terms of flexibility, individual learning, evaluation and problem-based learning (PBL) activities. According to a comprehensive study and meta-analysis by Athira Balakrishnan et al., Blended or mixed method learning is associated with higher academic achievement and grades than traditional pharmacy education [17].

Another study by Paul-Erik et al. on Blended Learning Course Design in Clinical Pharmacology for Post-graduate Dental Students found that a blended learning course design can be successfully used within postgraduate dental students, with the main components for discussion being time flexibility, change in teacher's role, and reinforced teaching activities towards practicing dentistry [18].

Many educational institutions in developed countries use online and blended learning methodologies. Several countries have quickly modified their educational systems.⁹ The use of learning platforms like Microsoft Teams and Google Classroom has risen rapidly and is now also integrated in teaching. Moreover, each formative and digital assessment is on the rise. However, massive variations persist between schools and even between teachers, and sometimes teachers find difficulty in reaching individual students [19,20].

Educators and students have simply participated during a sweeping and abrupt shift within the use of technology to be learned. Result is a wider recognition that a blended learning approach will give the opportunities and adaptability necessary for the long run of education. Blended learning is the term given to the instructional practice of combining virtual learning equipment with more conventional classroom face to face teaching. In a true blended learning environment, both the student and the teacher should be physically located in the same space. Blended learning was a choice before coronavirus pandemic, but now, it's a necessity. Blended learning combines the benefits of individual learning with online technology tools. Pre and during the COVID-19 pandemic, researchers used multiple strategies to grasp its worth to academic and how space can play a role to ensure an enhanced

experience. Since the onset of the pandemic, educators have used a remote diary platform to assess how online learning is going for teachers and students [19,20,21].

Increasingly, blended-learning is changing into a most popular approach of delivering synchronous and asynchronous teaching and learning. A commonly held understanding of blended-learning environments combines Face to face instruction with technology-mediated instruction. Once teaching moved online several education settings used a range of learning platforms like Zoom, Teams, Moodle, Blackboard, Flip Grid, Google Meet, to name a few. This might differ across academic contexts. When teaching in an online environment, synchronous learning opportunities facilitate teacher-student social interaction during a virtual classroom space. A number of studies have demonstrated the advantages of online synchronous teaching, together with increased learning, improved communication, and strong group cohesion [1,17,20].

For many students, and workers alike, the human interaction between them in socio-cultural contexts is crucial to pedagogy. Teacher-student and student-student interactions are stipulations to effective teaching and learning experiences, course satisfaction, and profession opportunities. Though the inclusion of technology within the classroom has altered and improved teaching and learning for several educators, however they still got to focus on improvisation [20,21].

2. REVIEW METHODS

While writing this paper, very less published literatures were existed that specifically examined the adoption of blended learning with

in the field of education and experiences with in the higher pedagogy sector throughout COVID-19. However, between the beginnings of the transition to the submission of this paper, the topic has been explored in varied ways in several databases, or manually searched in Google and Pubmed. Various number of journal posts, editorials, short communication, analysis studies, short reports emerged, many online research articles printed, newspaper stories, conference papers, working papers, and books., highlighting the challenges and problems featured by students, faculty, and institutions as they made decisions about whether and how to provide continuity of education as COVID-19 cases continued to . A minireview was conducted to identify the teaching practices during COVID 19, adoption of technology in higher education during COVID 19, learning and teaching pedagogy throughout COVID 19, digital learning during the lockdown, online teaching during a pandemic, and application of blended learning during Covid-19 and post-Covid implication. The authors excluded systematic literature reviews, and studies published on other viruses and in other languages. The chosen analysis papers were from completely different parts of the countries like United States, United Kingdom, India, China, South East Asia and Europe to gain an National and international view on the topic. As the authors describe the papers already written, there was no need to get the formal ethical clearance from the authority. The main themes identified and discussed included online teaching practices during COVID-19 and blended mode of teaching in higher education and its implication during post Covid-19. The different database searches identified more than 90 articles, of which 35 full-text articles were assessed and nineteen were included in this paper.

3. RESULTS

Table 1. Detail characteristics of articles included in the short review

Author	Study/Article title	Type of paper	Inference
Shivangi Dhawan [22]	Online Learning: A Panacea in the Time of COVID-19 Crisis	Analysis Report	Online methods of teaching support and facilitate teaching and learning activities.
Ritimoni Bordoloi, Prasenjit Das, Kandarpa Das [23]	Perception towards online/blended learning at the time of Covid-19 pandemic: an academic analytics in the Indian context	Research Report	Blended learning is beneficial for both teacher and learner for providing education in the context of the 21st century India during any future crisis-like situations.
Ghaleb Awad E	Distance learning	Survey report	Distance learning has proven to be

Author	Study/Article title	Type of paper	Inference
Refae, Abdoulaye Kaba, Shorouq Eletter [24]	during COVID-19 pandemic :satisfaction, opportunities and challenges as perceived by faculty members and students		an effective solution for academic institutions and ensuring the continuation of the learning process.
Olasile Babatunde Adedoyin and Emrah Soykan [25]	Covid-19 pandemic and online learning: the challenges and opportunities	Review	If the obstacles faced during the pandemic are thoroughly investigated and translated into possibilities, online learning will become more sustainable and instructional activities will become more hybrid.
Dr. Wahab Ali [4]	Online and Remote Learning in Higher Education Institutes: A Necessity in light of COVID-19 Pandemic	Research report	Online and remote learning as a necessity in times of lock downs and social distancing due to COVID-19 pandemic. Provides a strong platform for further research.
Nicole Johnson, George Veletsianos, Jeff Seaman [26]	U.S. Faculty and Administrators' Experiences and Approaches in the Early Weeks of the COVID-19 Pandemic	Research article	A majority of faculty reported making changes to their assignments or exams as a result of transitioning to a new mode of delivery.
Shakti Chaturvedi, Sonal Purohit and Meenakshi Verma [8]	Effective Teaching Practices for Success During COVID 19 Pandemic: Towards Phygital Learning	Review article	The COVID 19 pandemic has guided the education system towards a new paradigm that needs to be explored for effective blended learning.
Michael Phillips Janet Scull, Umesh Sharma and Kathryn Garnier [27]	Innovations in teacher education at the time of COVID19: An Australian perspective	Short communication	The innovations included the conversion of all face to face course work units into online units, including synchronous and asynchronous learning opportunities.
Daniel Tolks Sebastian Kuhn, Sylvia Kaap-Fröhlich [28]	TeachingintimesofCOVID-19.Challengesand opportunities for digital teaching	Editorial letter	Digital education and training will enable tomorrow's health personnel to master crises such as the COVID-19 pandemic in the health system
Reza Rachmadtullah et al. [29]	Use of Blended Learning with Moodle: Study Effectiveness in Elementary School Teacher Education Students during The COVID-19 pandemic	Research note	Use of the moodle blended-learning model in during the COVID-19 pandemic period is effective and can be used as a network-based learning solution or online.
Dr. Rabiya Saboowala, Dr. Pooja Manghirmalani Mishra [30]	Blended Learning: The New Normal Teaching - Learning Pedagogy Post COVID-19 Pandemic	Short communication	There is a need for a paradigm shift in the education system to create and enable technology dependent learning environments post COVID-19 pandemic
Lisa R. Amir, Ira	Student perspective	Research article	Challenges during distance learning

Author	Study/Article title	Type of paper	Inference
Tanti, Diah Ayu Maharani, Yuniardini Septorini Wimardhani, Vera Julia, Benso Sulijaya & Ria Puspitawati [31]	of classroom and distance learning during COVID-19 pandemic in the undergraduate dental study program Universitas Indonesia		included unstable internet connection, extra financial burden for the internet quota and internal factors such as time management and difficulty to focus while learning online for a longer period of time.
Dawn Joseph, Robyn Trinick [32]	'Staying Apart Yet Keeping Together': Challenges and Opportunities of Teaching During COVID-19 Across the Tasman	Short article	A blended approach of partial work from campus and from home continues to be the way forward depending on health and safety guidelines
Kimkong Heng, Koemhong Sol [9]	Online learning during COVID-19: Key challenges and suggestions to enhance effectiveness	Short article	In the post-COVID-19 environment, the essay finishes with an overview of important problems, suggestions, and brief recommendations for increased adoption of online and blended learning.
Fernando Ferri, Patrizia Grifoni and Tiziana Guzzo [33]	Online Learning and Emergency Remote Teaching: Opportunities and Challenges in Emergency Situations	Concept Paper	The open challenges emerging from this health emergency may prove crucial in improving the capability to provide effective online learning,
Muna Sharma, Tulashi Adhikari, Tilarupa Bhattarai, Tulza K.C [34]	Education Shift During COVID-19: Students' Satisfaction with Emergency Distance Learning	Research article	The swift conversion of conventional face-to-face class to online mode during COVID-19 pandemic is accepted by the students
Maria Assunção Flores & Marília Gago [35]	Teacher education in times of COVID-19 pandemic in Portugal: national, institutional and pedagogical responses	Short communication	The paper concludes with the discussion of the implications for teaching and teacher education in such uncertain times, particularly in regard to the role of practice as well as issues of mentoring within the context of a practicum as a 'real practice' versus 'an ideal practice.
Spoel, Irene; Noroozi, Omid; Schuurink, Ellen; Ginkel, Stan [36]	Teachers' online teaching expectations and experiences during the Covid19pandemic in the Netherlands	Research article	Results demonstrated a significant change in the perception of teachers regarding their resolutions to implement technology in their lessons in a post-corona era.
Maria Assunção Flores & Anja Swennen [37]	The COVID-19 pandemic and its effects on teacher education	Editorial paper	Institutions and teacher educators encountered and experienced the challenges and opportunities to carry on their job in such unexpected circumstance
Terence Day, I-Chun Catherine Chang, Calvin	The Immediate Impact of COVID-19 on Postsecondary	Short Review	Online and remote learning was a satisfactory experience for some students, various inequities were

Author	Study/Article title	Type of paper	Inference
King Lam Chung, William E. Doolittle, Jacqueline Housel & Paul N. McDaniel [38]	Teaching and Learning		involved. Many students lacked appropriate devices for practical work and encountered difficulties in securing suitable housing and workspace.
Xibin Han Qian Zhou Wanruo Shi Shuyuan Yang [39]	Online Learning in Vocational Education of China during COVID-19: Achievements, Challenges, and Future Developments	Research article	During the pandemic in China, most vocational institutes used online learning as an emergency response to the pandemic.
Jessie S. Barrot,correspon ding author Ian I. Llenares, and Leo S. del Rosario [40]	Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines	Research article	Greatest issue was related to learning environment at home, while technical knowledge and proficiency was their least significant challenge.

4. DISCUSSION

This current COVID-19 pandemic, changes not solely the use of technology in education however the pedagogy ways within the future. There has been a worldwide paradigm shift in international and national thinking, attributed partially to advances in technology. The role and purpose of ancient approaches to learning is questionable with the emergence of on-line learning [41].

The findings of the short review after an intensive compilation and studying of the included literatures disclosed that majority of the paper recommended the utilization of blended learning as compared to solely e-learning. Majority of them additionally expressed that blended learning is versatile and one amongst the ways to accommodate current changes of pandemic is to acknowledge the benefits of using blended-learning environments. The knowledge gain and performance of the scholars as a result of E-learning were shown to be equivalent to that of face to face methods [42,43].

The Corona virus has shown growing flaws in educational systems all across the world. As the globe faces uncertain futures, it is apparent that society demands flexible and robust education institutions [43,44]. Branch & Dousay stated that online learning might be a sort of distance education that involves the use of technology as a mediator of the educational process and that all instruction is given via the internet [45]. This study found that online learning was a flexible

and effective source that enables students to become autonomous learners, though disadvantages associated with the lack to show and learn practical and clinical work were additionally highlighted. Another criticality was depicted by the shortage of immediate feedback for college students.

Muna Sharma, Tulashi Adhikari, Tilarupa Bhattarai, Tulza K.C [46] conducted a cross-sectional survey to assess the 200 nursing students satisfaction with emergency distance learning studying in five nursing campuses of Tribhuvan University. The electronic link of the form was shared to the participants via their emails, vipers and messengers. The findings shows that only 49% students were enjoying online platform applications and >90% of them felt need for training regarding use of technology for distance learning. The setting for teaching and learning was comfortable for >2/3rd of the scholars, 74.5% were glad with the instructor's encouragement for active learning and >1/3rd had problems with the instructor's pace of promptness. The classes were interrupted due to technological error. The web charges were expensive and students refused practical classes through distance learning mode.

Grant [47] expressed that distance learning is itself a sort of blended learning, which uses a spread of co-ordinated and planned methods to deliver the curriculum and enable students to find out effectively. Kaing [48] in his study expressed that before COVID-19 epidemic, the idea of involving blended learning was introduced in only

a few colleges, but it was never used as a learning method.

Blended learning refers to the practices that mix ancient face-to-face schoolroom instruction with on-line learning. Park & Shea [49] expressed that compared with different varieties of on-line learning, blending learning provides students with additional fruitful channels of getting connected with their friends, peers and instructors.

With the help of social interaction, Garrison and Kanuka [50] found that mixed learning provides students with better knowledge of course content.

However, in a broader sense, blended learning approaches involve courses that are designed, organized, and administered using a combination of physical and virtual learning activities. Blended learning has previously been reported to improve student satisfaction, motivation, engagement, and performance [51,52]. This strategy encourages active, self-directed learning and is often used in school as a supplement to traditional learning [53].

Several researches around the world, including one by Hirata Yoko et al. [54], found that the majority of academics preferred online learning to traditional classes, and that combining online and face-to-face learning was beneficial to the students. Continuing to use blended learning can help students in taking full advantage of this investment. Learners will remain comfortable with technology as a component of their education if they continue to use gadgets and online tools, while educators can continue to explore the potential of online learning [55].

Blended learning being one of the best approaches suggested, in which online strategies can be used together for teaching-learning together while adhering to social distancing standards such as working from home and avoiding gatherings. Blended learning is a strategy that employs a web-based approach to teaching and learning with the use of technology in order to improve the educational process and appeal to a larger audience, particularly those who wish to participate but are unable to due to distance. This could be what makes blended learning a feasible educational approach in the midst of the COVID-19 pandemic [56]. Hwang and Arbaugh [57] examined the coed feedback seeking behavior of the students

enrolled in seven blended undergraduate HR and management courses. They assessed that the scholars who look for positive behaviour attended to participate a lot of more actively in discussion forums and look for feedback each within and outdoors of class meetings, whereas students having negative feedback-seeking behaviour tended to seek instructions outside of the classroom and participate in additional more discussion forums but with less intensity. Despite some challenges, students could adapt to the new learning methods of full Distance Learning and also the majorities agreed blended learning that combined classroom and distance learning will be implemented henceforth [58].

Ritimoni Bordoloi, Prasenjit Das Kandarpa Das [23]expressed in their academic analysis paper stated that majority of the respondents preferred the blended style of learning as the most suitable model of learning within the coming days in the Indian and context. It is also been found that due to the low level of internet connectivity for educational purposes, it's impractical to access fully online or synchronous teaching learning facilities by all in equitable way. Therefore, the asynchronous ways in education can provide the optimum learning opportunity to all in a very flexible and convenient way. So, the blended kind of learning, which is mostly learner-centric and cost-effective, goes to influence the complete Indian educational scenario in the coming days.

5. CONCLUSION

More government support and investment is needed to ensure blended learning is widely used in post-pandemic times in developing societies. Higher education institutions also need to participate to improve and manage existing online learning methods and expansion of Internet access and online library resources. To ensure that students, teachers, and staff have the opportunity of it, digital learning, coaching, education, and student support, including lessons using a variety of teaching and learning tools and methods, are provided daily to help students, teachers, and faculty members to improve their knowledge and understanding of different aspects of blended learning.

6. LIMITATION

Only nineteen research records from a few nations were considered, and none were authored in languages other than English. For a

few articles, the discussion and findings were based on record analysis.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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