

Online learning Tools/strategies that were Used during the COVID-19 Pandemic: A Systematic Literature Review

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Abstract:

Covid-19 came with unprecedented changes in higher education necessitated by a need to save the academic year all over the world. Institutions and instructors all over the world had to devise different strategies for teaching and learning under unfavorable circumstances. This included the development of content suitable for online learning and assessments during these challenging times. To save the academic year online strategies/tools had to be used. This article navigates through existing literature to observe the online learning strategies/tools that were used during the COVID-19 pandemic. This study uses a systematic literature review methodology as adopted by Tranfield, Denver, and Smart (2003) and modified by Hansen and Schaltegger (2016) to explore and unveil all the existing online learning strategies used during COVID-19. A systematic review is a transparent and reproducible process for literature identification related to online learning tools during COVID-19. The study covers articles written from 2019 to the end 2021 calendar year. The results show video conferencing tools were used to conduct classes with Zoom the, most used tool, and Teams, Google Meet, and Youtube amongst others. Social media platforms such as WhatsApp, Facebook, Linked In, and Twitter amongst others were used for communication purposes. The online learning strategies/tools were a saving grace during the Covid-19. These results give insights of the existing online learning tools used during crises all over the world and serve as guidance for future use in case of crisis. Further, gives insights to government, and academic institutions on what worked and did not work during the pandemic in education.

Keyword: COVID-19, Online learning tools, systematic literature review

Introduction

Due to hard lockdown many academic institutions all over the world had to adapt and quickly introduce online learning strategies. This included the introduction of different tools to ensure that the academic year was saved ¹. Necessitated by the outbreak that leads to high distraction all over the world ². The main purpose of this study is to answer the research question, of what online

¹ Atika Qazi et al., "Conventional to Online Education during COVID-19 Pandemic: Do Develop and Underdeveloped Nations Cope Alike," *Children and youth services review* 119 (December 2020): 105582, <https://pubmed.ncbi.nlm.nih.gov/33071406>.

² Leili Yekefallah et al., "Factors Related to Students' Satisfaction with Holding e-Learning during the Covid-

learning strategies/tools were used by academic institutions during Covid-19. To answer this research question, the study navigates through literature to shed light and come to objective list of what worked and what could possible work in the future. The understanding of these online learning strategies is important to understand what worked during times of crisis. Many lessons could be learned from literature for future use in academic institutions in future crises. Further, other online learning strategies may be appropriate for future use under normal circumstances. It is essential to derive the know-how from different perspectives and form a consolidated study in the form of a systematic literature review paper.

This study will answer the research question in many ways, firstly the study navigates through the literature on all relevant studies that are available in the literature about different strategies that were used during COVID-19. The study used the literature review methodology as adopted by Tranfield, Denver, and Smart³ and modified by Hansen and Schaltegger⁴ to explore the literature to come up with strategies and suggest future research. It is interesting to note how instructors and students navigated through through difficult times of the COVID-19 crisis.

Many studies examined the impact of online learning from students' perspective during COVID-19, such as Maqableh and Alia⁵, on students' engagement during COVID-19 and came to the conclusion that online learning was determined by the manner in which learning is done. From students' attitudes, Hussein et al.⁶ concluded that online learning presented students with positive effects like safety, and efficiency based on time, however, distraction, technological challenges, and lack of support from the teacher were also noted as the major issues. From the satisfaction of students during COVID-19, Yekefallah et al.⁷ found that students were more satisfied with online learning than others. This shows that COVID-19 had advantages and some students were actually enjoying online learning. Important to note that, as much as it does not look like both the instructors and students were ready for online learning, perhaps there was a dilemma

19 Pandemic Based on the Dimensions of e-Learning,” *Heliyon* 7, no. 7 (July 21, 2021): e07628–e07628, <https://pubmed.ncbi.nlm.nih.gov/34381894>.

³ David Tranfield, David Denyer, and Palminder Smart, “Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review,” *British Journal of Management* 14, no. 3 (2003): 207–222, <http://dx.doi.org/10.1111/1467-8551.00375>.

⁴ Erik G Hansen and Stefan Schaltegger, “The Sustainability Balanced Scorecard: A Systematic Review of Architectures,” *Journal of Business Ethics* 133 (2016): 193–221.

⁵ Mahmoud Maqableh and Mohammad Alia, “Evaluation Online Learning of Undergraduate Students under Lockdown amidst COVID-19 Pandemic: The Online Learning Experience and Students’ Satisfaction,” *Children and youth services review* 128 (September 2021): 106160, <https://pubmed.ncbi.nlm.nih.gov/36540702>.

⁶ Elham Hussein et al., “Exploring Undergraduate Students’ Attitudes towards Emergency Online Learning during COVID-19: A Case from the UAE,” *Children and Youth Services Review* 119 (2020): 105699, <http://dx.doi.org/10.1016/j.childyouth.2020.105699>.

⁷ Yekefallah et al., “Factors Related to Students’ Satisfaction with Holding e-Learning during the Covid-19 Pandemic Based on the Dimensions of e-Learning.”

on how the online learning worked. Anyway, Covid-19 affected everyone, both individuals and companies all over the world ⁸. Against this background, they were more inspired by online learning ⁹. In the same line of thought, Qazi et al., ¹⁰ concluded that more students showed optimism about online learning, however, there were differences in perceptions between students who live in urban areas and those living in rural areas. This may have been caused by many reasons such as, access to learning resources and lack of infrastructure is felt much in rural areas than in urban areas.

Indeed, students living in urban areas and those living in rural areas had a different experience altogether as confirmed by Mseleku ¹¹ in his conclusion that students living in rural areas found it difficult to adjust to the e-learning environment, due to many challenges such as and lack of infrastructure accompanied by lack of resources such as laptops, data and more, more especially in developing countries, like South Africa. It appears that as much as COVID-19 affected everybody many groups were affected in exactly different ways as emphasised by Maqableh and Alia¹² when they concluded from students' perspectives that there were both negative and positive effects to students ranging from technological, and social issues, time management. Perhaps students voiced their dissatisfaction as they were highly distracted and that led to impaired focus. This shows that online learning had more impact than as it came unexpected from both students and teacher's perspectives. As much as there are many studies conducted on literature review during COVID-19, to the author's knowledge and accessed literature there is no study that focused on the online strategies used during COVID-19. For instance, Mseleku ¹³ conducted a study on the systematic literature review during Covid-19 . She focused on only 2020 and concluded that there were very few studies that focused on e-learning challenges and benefits. His studies focused much on the challenges faced by teachers and students. Nevertheless, this study focuses on the e-learning tools that were used during Covid 19. The study is extended to include from 2019 to 2021, this is meant to capture full period in which Covid existed as some academic institutions still carried on with e-learning during 2021 academic year.

⁸ Zethembe Mseleku, "A Literature Review of E-Learning and E-Teaching in the Era of Covid-19 Pandemic" (Sage Los Angeles, CA, USA; 2020).

⁹ Ghulam Murtaza Rafique et al., "Readiness for Online Learning during COVID-19 Pandemic: A Survey of Pakistani LIS Students," *Journal of academic librarianship* 47, no. 3 (May 2021): 102346, <https://pubmed.ncbi.nlm.nih.gov/36536686>.

¹⁰ Qazi et al., "Conventional to Online Education during COVID-19 Pandemic: Do Develop and Underdeveloped Nations Cope Alike?"

¹¹ Mseleku, "A Literature Review of E-Learning and E-Teaching in the Era of Covid-19 Pandemic."

¹² Maqableh and Alia, "Evaluation Online Learning of Undergraduate Students under Lockdown amidst COVID-19 Pandemic: The Online Learning Experience and Students' Satisfaction."

¹³ Mseleku, "A Literature Review of E-Learning and E-Teaching in the Era of Covid-19 Pandemic."

Methods

According to Tranfield et al.¹⁴, systematic literature review is a transparent, yet reproducible manner in which literature is reviewed. This study adopts Tranfield et al.¹⁵ six steps which are (1) selection of research, (2) design for inclusion and exclusion criteria, (3) study identification, (4) Study quality examination, (5) Extraction of data, and (6) Synthesis of data. These steps are followed and the discussion and results section presents the 6th step. Systematic literature review, is a key mechanism to manage various information management for explicit academic questions¹⁶, in a translucent and reproducible way¹⁷, clearly defined for the reader¹⁸, to provide evidence-based solutions¹⁹. According to Nightingale²⁰, a systematic literature review really stands out, due to the limited bias as the researcher has to include all available literature in an objective manner. For this reason, the systematic literature review is adopted to come to an objective conclusion. We adopt the approach from Tranfield, Denver, and Smart²¹ and modified by Hansen and Schaltegger²² which consists of six stages as outlined below:

Selection of research

Consistent with Hansen and Schaltegger²³, Vitolla et al.²⁴ used “keywords, manual reading of papers, references of identified articles” to conduct a systematic review study. The study followed suit by identifying keywords that will be relevant to conducting the search, since the study is related to online learning tools/strategies during COVID-19, the keywords are related to these two

¹⁴ Tranfield, Denyer, and Smart, “Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review.”

¹⁵ Tranfield, Denyer, and Smart, “Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review.”

¹⁶ Tranfield, Denyer, and Smart, “Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review.”

¹⁷ Christine Gimbar, Bowe Hansen, and Michael E Ozlanski, “Early Evidence on the Effects of Critical Audit Matters on Auditor Liability,” *Current Issues in Auditing* 10, no. 1 (2015): A24–A33, <http://dx.doi.org/10.2308/ciia-51369>.

¹⁸ Chris Cooper et al., “Defining the Process to Literature Searching in Systematic Reviews: A Literature Review of Guidance and Supporting Studies,” *BMC medical research methodology* 18, no. 1 (August 14, 2018): 85, <https://pubmed.ncbi.nlm.nih.gov/30107788>.

¹⁹ Denise Linda Parris and Jon Welty Peachey, “A Systematic Literature Review of Servant Leadership Theory in Organizational Contexts,” *Journal of Business Ethics* 113, no. 3 (2012): 377–393, <http://dx.doi.org/10.1007/s10551-012-1322-6>.

²⁰ W Joellen, “The Historical Evolution of Theories and Conceptual Models for Nursing,” *Rie* (1988).

²¹ Tranfield, Denyer, and Smart, “Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review.”

²² Hansen and Schaltegger, “The Sustainability Balanced Scorecard: A Systematic Review of Architectures.”

²³ Hansen and Schaltegger, “The Sustainability Balanced Scorecard: A Systematic Review of Architectures.”

²⁴ Filippo Vitolla et al., “The Impact of National Culture on Integrated Reporting Quality. A Stakeholder Theory Approach,” *Business strategy and the environment* 28, no. 8 (2019): 1558–1571.

keywords were used “Online learning tools”, and “Online learning strategies”. The search was done on academic search engines, Google Scholar, ScienceDirect, Google, and Scopus. The search was done using keywords as noted above. Consistent with previous studies articles written in English as a language, from a specific period 2019-2021, and reject non-English papers, identical papers, non-peer reviewed papers, unpublished masters and doctoral dissertations, and grey literature ²⁵. All data was collected from different sources and was populated in a tabular format, refer to Table 1 below:

Table 1: Summary of accessed studies based on search

Phase	Online learning during Covid 12	Total accessed articles with online tools search phrase
google scholar	171	119
ScienceDirect	23	9
Google	12	4
Scopus	55	29
Total	261	161

Design of inclusion and exclusion criteria

Online learning is a well-researched phenomenon, so there are a lot of studies in literature hence the criteria are designed to be explicit of studies that were taken into consideration. Firstly we considered all studies except studies done in non-profit organisation ²⁶. The research focused mostly on educational institutions that conducted online learning during Covid-19. There is value in focusing specifically on studies done in educational institutions as this article navigates through the literature to identify these learning strategies or online tools. We used English as the language criteria, other studies will be excluded due to lack of time and extreme costs associated with conversion from other languages to English ²⁷. Additionally, Arksey and O'Malley ²⁸ alluded that due to these reasons, it is appropriate to leave out other studies. The following diagram gives an overview of the studies that were accessed in total up to the final studies that were analysed.

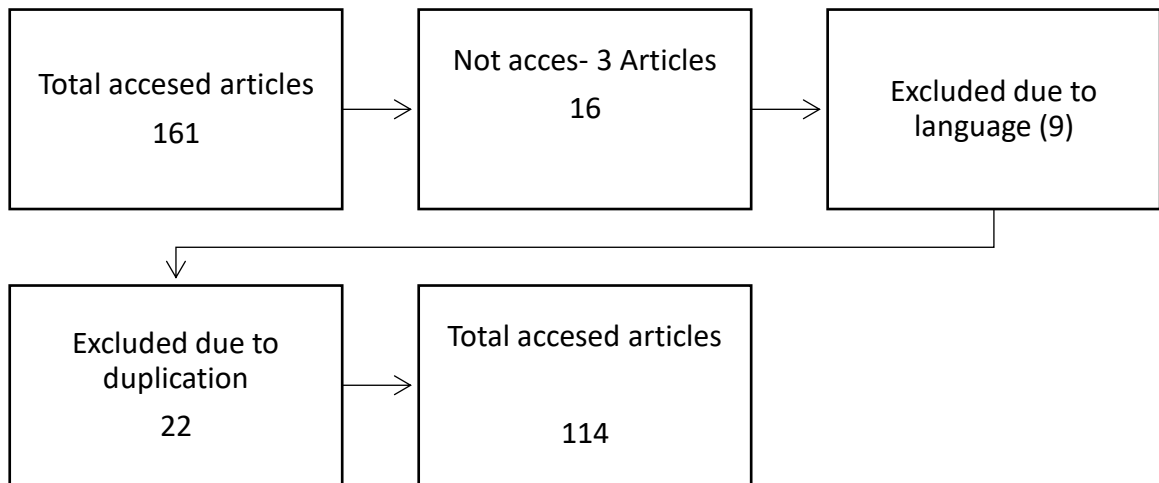
²⁵ Esraa Al-Shatti and Marc Ohana, “Impression Management and Career Related Outcomes: A Systematic Literature Review,” *Frontiers in psychology* 12 (July 30, 2021): 701694, <https://pubmed.ncbi.nlm.nih.gov/34393939>.

²⁶ Hansen and Schaltegger, “The Sustainability Balanced Scorecard: A Systematic Review of Architectures.”

²⁷ Frank Ranganai Matenda et al., “Bankruptcy Prediction for Private Firms in Developing Economies: A Scoping Review and Guidance for Future Research,” *Management Review Quarterly* 72, no. 4 (2021): 927–966, <http://dx.doi.org/10.1007/s11301-021-00216-x>.

²⁸ Hilary Arksey and Lisa O'Malley, “Scoping Studies: Towards a Methodological Framework,” *International Journal of Social Research Methodology* 8, no. 1 (2005): 19–32, <http://dx.doi.org/10.1080/1364557032000119616>.

Figure: 1: Total accessed and examined articles



Source: Own compilation

Study identification

Titles and abstracts were examined and this led to the reduction of studies. This is done to ensure that there are no duplicate studies²⁹. Further introduction was considered to see the relevance of the studies and this resulted in further elimination of irrelevant studies. Moreover, the whole article was considered and this led to the elimination of other studies as well. The total sample ended up being 114 articles.

Study quality examination

Only peer-reviewed articles were considered to ensure the quality of the research outcomes. Also, conference proceedings were considered as they are also blinded to reviewed academic work. Non-peer-reviewed papers, unpublished masters and doctoral dissertations, and grey literature were excluded as suggested by Al-Shatti & Ohana³⁰.

(i) Extraction of data

²⁹ Hansen and Schaltegger, "The Sustainability Balanced Scorecard: A Systematic Review of Architectures."

³⁰ Al-Shatti and Ohana, "Impression Management and Career Related Outcomes: A Systematic Literature Review."

Data was extracted and recorded on Microsoft Excel and data was captured including authors, year of publication, title, Objectives of the study, name of the journal /academic conference proceeding, Study techniques design, and result ³¹.

(ii) Synthesis of data

Consistent with studies of Hansen and Schaltegger ³², data was synthesised using descriptive statistics, and graphs and this is the most superlative way to answer the research question. Further, the integrative conceptual model was used to show the link between online strategies and learning during COVID-19.

Result And Discussion

This section presents the results of the study which is the synthesis of data, stage number 6 as per Hansen and Schaltegger (2016). The data is presented based on the studies in Table 2. These studies were reviewed and different online learning strategies/tools were identified. There appear to be many online learning strategies, that were used, from Leaner Management systems such as Moodle and Blackboard, Vidoe conferencing online tools such as Zoom and Teams, and social media such as Facebook and WhatsApp. The below table presents the summary of the reviewed studies which are discussed below the table.

Table 2: Accessed and examined articles

No	Author	Year of publication	Title	Name of the journal	Online tools/strategy
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³¹ Matenda et al., “Bankruptcy Prediction for Private Firms in Developing Economies: A Scoping Review and Guidance for Future Research.”

³² Hansen and Schaltegger, “The Sustainability Balanced Scorecard: A Systematic Review of Architectures.”

1	Atika Qazi a,* Javaria Qazi b, Khulla Naseer b,* Muhammad Zeeshan c, Shiza Qazi d, Olusola Abayomi-Alli e, Ibrahim Said Ahmad f, Mohammad Darwich g, Bandeh Ali Talpur h, Glenn Hardaker a, Usman Naseem i, Shuiqing Yang j, Khalid Haruna k	2021	Adaption of distance learning to continue the academic year amid COVID-19 lockdown	Children and Youth Serzoomvices Review	zoom, Teams, Google classroom, Internet
2	A. Patricia Aguilera-Hermida 1	2020	College students' use and acceptance of emergency online learning due to COVID-19	International Journal of Educational Research Open	Zoom, Teams, Google, Ticktalk, LinkedIn, Twitter, Facebook, etc
3	Raden Arief Nugroho, Achmad Basari, Valentina Widya Suryaningtyas, Setyo Prasiyanto Cahyono	2020	University Students' Perception of Online Learning in Covid-19 Pandemic A Case Study in a Translation Course	2020 International Seminar on Application for Technology of Information and Communication (iSemantic)	Google Classroom, Google Meet, Omega T,
4	Hiep-Hung Pham & Tien-Thi-	2020	Vietnamese higher education	Higher Education Research & Development	Facebook, Zalo, Teams, Google

	Hanh Ho		during the post COVID-19 pandemic		classroom,
5	Dr. Naziya Hasan, Dr. Naved Hassan Khan	2020	ONLINE TEACHING-LEARNING DURING COVID-19 PANDEMIC: STUDENTS' PERSPECTIVE	The Online Journal of Distance Education and e-Learning,	WebEx, ZOOM, Google Meet, Say Namaste, Moodle, Blackboard, Google Classroom, Google Hangouts, Whatsapp, Youtube, Telegram, Edx, Udemy, FACEBOOK,
6	Deepika Nambiar ^{1*}	2020	The impact of online learning during COVID-19: students' and teachers' perspective	The International Journal of Indian Psychology	Google duo, Youtube, Moodle, Jitsi, Teams, Whatsapp, Lark, Avaya space
7	Michael W. Marek, Chiou Sheng Chew, and Wen-chi Vivian Wu	2021	Teacher Experiences in Converting Classes to Distance Learning in the COVID-19 Pandemic	International Journal of Distance Education Technologies	LMS
8	Sujeewa Hettiarachchi ^{1,*} , BWR Damayanthi ¹ , Shirantha Heenkenda ¹ , DMSLB Dissanayake	2021	Student Satisfaction with Online Learning during the COVID-19	Sustainability MDPI	Zoom

	2 Manjula Ranagalage 2 and Lalith Ananda 1		Pandemic: A Study at State Universities in Sri Lanka		
9	Amanda M. Y. Chu ,* , Connie K. W. Liu , Mike K. P. So and Benson S. Y. Lam	2021	Factors for Sustainable Online Learning in Higher Education during the COVID- 19 Pandemic	Sustainability MDPI	Zoom breakout rooms, Blackboard, Canvas or Moodle, Facebook or WhatsApp groups,
1 0	Carlos Peñarrubia- Lozano 1, Manuel Segura- Berges 2, Manuel Lizalde-Gil 1 and Juan Carlos Bustamante	2021	A Qualitative Analysis of Implementing E- Learning during the COVID- 19 Lockdown	Sustainability MDPI	Zoom, Skype, Google Meet, Google Classroom,
1 1	César Torres Martín 1,* , Christian Acal 2 , Mohammed El Homrani 1 and Ángel Custodio Mingorance Estrada	2021	Impact on the Virtual Learning Environment Due to COVID- 19	Sustainability MDPI	Google Meet, Skype, Zoom, Twitter, Facebook, Instagram, Moodle - PRADO, Google Classroom, Whatsapp, Telegram, Kahoot, Quizizz, Edmodo, Google Groups, Tapatalk, Convo,

1 2	Arturo Realyvásquez-Vargas 1,* , Aidé Aracely Maldonado-Macías 2 , Karina Cecilia Arredondo-Soto 3 , Yolanda Baez-Lopez 4 , Teresa Carrillo-Gutiérrez 3 and Guadalupe Hernández-Escobedo	2020	The Impact of Environmental Factors on Academic Performance of University Students Taking Online Classes during the COVID-19 Pandemic in Mexico	Sustainability MDPI	Google meet, Teams, Zoom and Drive, Classroom or Facebook.
1 3	Tinggui Chen 1,* , Lijuan Peng 1, Bailu Jing 2, Chenyue Wu 2, Jianjun Yang 3 and Guodong Cong	2020	The Impact of the COVID-19 Pandemic on User Experience with Online Education Platforms in China	Sustainability MDPI	DingTalk, Tencent Meeting, Zoom Cloud, Chaoxing, MOOC, TIM, WeChatWork
1 4	Maman Suryaman1, Yoyok Cahyono2, Dadah Muliansyah3, Otto Bustani4, Popong Suryani5, Mochammad Fahlevi6, Rudy Pramono7, Agus Purwanto8*, John Tampil Purba9,	2020	COVID-19 PANDEMIC AND HOME ONLINE LEARNING SYSTEM: DOES IT AFFECT THE QUALITY OF PHARMACY SCHOOL LEARNING	A multifaceted review journal in the field of pharmacy	Google Classroom, Whatsapp, Quipper

	Ashiong Parhehean Munthe10, Juliana11, Shubhi Mahmashony Harimurti12		G?		
1 5	Tira Nur Fitria	2020	Teaching English through Online Learning System during Covid-19 Pandemic	Journal of English Language Teaching	Zoom, Google Classroom, Schoology, Edmodo, Moodle, Google Meet, WhatsApp, SPADA System, Elena Platform, UCY Learning, English Discoveries, Email, Skype, and BlogSpot
1 6	Muhammad Nur Yasir Utomo1*, Memet Sudaryanto2, Kundharu Saddhono2	2020	Tools and Strategy for Distance Learning to Respond COVID-19 Pandemic in Indonesia	Ingénierie des Systèmes d'Information	Google Classroom, Whatsapp group, Zoom, Edmodo, Google Meet), Facebook, Instagram
1 7	Dr. Pravat Kumar Jena	2020	ONLINE LEARNING DURING LOCKDOWN PERIOD FOR COVID-19 IN INDIA	INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH	ZOOM, Google Meet, Facebook, Skype, Youtube, UberConference, DingTalk, Lark, Teams, TrueConf Online, Slack

					Video Calls- and Lifesize Go-
18	Mohammad Mahyooob	2020	Challenges of e-Learning during the COVID-19 Pandemic Experienced by EFL Learners	Arab World English Journal (AWEJ)	Emails, Whatsapp, Zoom, Google, Teams, Blackboard
19	Shima Tabatabai	2020	Simulations and Virtual Learning Supporting Clinical Education During the COVID 19 Pandemic	Advances in Medical Education and Practice	Skype, Zoom, and Google Hangouts Meet.
20	Digvijay Pandey1 · Gabriel A. Ogunmola2 · Wegayehu Enbeyle3 · Marzuk Abdullahi4 · Binay Kumar Pandey5 · Sabyasachi Pramanik6	2022	COVID-19: A Framework for Effective Delivering of Online Classes During Lockdown	ARENA OF PANDEMIC	Microsoft Teams:, Google Classroom, Zoom:, Impartus, Webex, Tcexam, Moodle, FlexiQuiz, EdBase, Tcexam, Virtualx:
21	Sofia B. Dias1,6, Sofia J. Hadjileontiou2,6, José Diniz1 & Leontios J. Hadjileontiadis	2020	DeepLMS: a deep learning predictive model for supporting online learning in the Covid-19 era	Scientific Reports	Zoom, WebEx, MS Teams, Moodle, Blackboard and Google Classroom,

2 2	Irini Chatziralli 1 ● Camila V. Ventura2,3 ● Sara Touhami4 ● Rhianon Reynolds5 ● Marco Nassisi 6,7 ● Tamir Weinberg8,9 ● Kaivon Pakzad-Vaezi10 ● Denis Anaya11 ● Mushawiahti Mustapha12 ● Adam Plant13 ● Miner Yuan14 ● Anat Loewenstein 15,16 ●	2021	Transforming ophthalmic education into virtual learning during COVID-19 pandemic: a global perspective	Eye	Zoom,
2 3	Livia Puljak1* , Marta Čivljak1, Ana Haramina1, Snježana Mališa1, Dalibor Čavić1, Dinko Klinec1, Diana Aranza2, Jasna Mesarić3, Nataša Skitarelić4, Sanja Zoranić5, Dijana Majstorović6, Marijana Neuberg7, Štefica	2020	Attitudes and concerns of undergraduate university health sciences students in Croatia regarding complete switch to elearning during COVID-19 pandemic: a survey	BMC Medical Education	Teams, Zoom,

	Mikšić ⁸ and Kata Ivanišević ⁹				
24	Lisa R. Amir ^{1,2} , Ira Tanti ^{1,3} , Diah Ayu Maharani ⁴ , Yuniardini Septorini Wimardhani ⁵ , Vera Julia ⁶ , Benso Sulijaya ⁷ and Ria Puspitawati ^{1,2*}	2020	Student perspective of classroom and distance learning during COVID-19 pandemic in the undergraduate dental study program Universitas Indonesia	BMC Medical Education	Microsoft Teams, Google meets, Zoom and Moodle
25	Mahmoud Al-Balas ^{1*} , Hasan Ibrahim Al-Balas ² , Hatim M. Jaber ³ , Khaled Obeidat ⁴ , Hamzeh Al-Balas ⁵ , Emad A. Aborajoo ⁶ , Raed Al-Taher ⁷ and Bayan Al-Balas ⁸	2020	Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: current situation, challenges, and perspectives	BMC Medical Education	ZOOM, Microsoft Teams, WhatsApp groups, Facebook groups, YouTube channels, Moodle, and Skype.
26	Abdelsalam M. Maatuk ¹ , Ebitisam K. Elberkawi ¹ , Shadi	2022	The COVID-19 pandemic and E-learning:	Journal of Computing in Higher Education	MOODLE over Blackboard

	Aljawarneh2 · Hasan Rashaideh3 · Hadeel Alharbi4		challenges and opportunities from the perspective of students and instructors		
2 7	Michael Smigelski1 & Miyad Movassaghi1 & Alexander Small2	2020	Urology Virtual Education Programs During the COVID- 19 Pandemic	Current Urology Reports	Zoom, Citrix Webex, and GoToMeeting
2 8	Nina Bergdahl1 · Jalal Nouri1	2021	Covid-19 and Crisis- Prompted Distance Education in Sweden	Technology, Knowledge and Learning	Google classroom, Google meet, Youtube, Gleerups, Teams, Google Hangout, Bingel, Zoom, Gsuite, Google Drive, UR Play, Sli,
2 9	Darren Turnbull1 · Ritesh Chugh1 · Jo Luck1	2021	Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge?	Education and Information Technologies	Zoom and Skype, Youtube Moodle, Facebook,

30	Adeoye, I. A.1, Adanikin, A. F.2, Adanikin, A.	2020	COVID-19 and E-Learning: Nigeria Tertiary Education System Experience	International Journal of Research and Innovation in Applied Science (IJRIAS)	Zoom, Microsoft teams, google hangout (meet), skype, Bamboo learning, google classroom, Docebo, WIZIQ, Adobe captivate, Elucidat, Blackboard
31	Md. Alaul Alam	2020	Challenges and Possibilities of Online Education during Covid-19	Preprints	Zoom, FoxFi, Audioboo
32	Azmil Hasan Lubis, Muhammad Darwis Dasopang	2021	Online learning during the covid-19 pandemic: How is it implemented in elementary schools?	Premiere Educandum: Journal of Basic Education and Learning	Google Classroom
33	Ahmad Alif Kamal1, Norhunaini, Mohd Shaipullah2, Liyana Truna3, Muna Sabri4, Syahrul N. Junaini5	2020	Transitioning to Online Learning during COVID-19 Pandemic: Case Study of a Pre-University Centre in Malaysia	International Journal of Advanced Computer Science and Applications	ZOOM Cloud Meeting, Youtube, Socrative, Google Docs, Google Hangouts Meet, Microsoft Teams, Blackboard, Google Classroom, Moodle

					Cloud, Facebook, Whatsapp, Telegram, Teams
3 4	Anas Ratib Alsoud 1,* and Ahmad Ali Harasis 2	2021	The Impact of COVID-19 Pandemic on Student's E-Learning Experience in Jordan	J. Theor. Appl. Electron. Commer	Microsoft Teams, Zoom, Youtube, Google Meet, Whatsapp, emails
3 5	Seble Tadesse1, Worku Muluye2	2020	The Impact of COVID-19 Pandemic on Education System in Developing Countries: A Review	Open Journal of Social Sciences	Blackboard, Zoom, TronClass, Classin, and Wechat group platforms
3 6	Irfan Fauzi1*, Iman Hermawan Sastra Khusuma2	2020	Teachers' Elementary School in Online Learning of COVID-19 Pandemic Conditions	Jurnal Iqra' : Kajian Ilmu Pendidikan	, Whatsapp, zoom, Google classroom, Google Form, Edmodo, Youtube, Rumah Belajar, Cisco, Ruang Guru, Skype, Lainnya
3 7	Sutarto (1*), Dewi Purnama Sari2, Irwan Fathurrochman3	2020	Teacher strategies in online learning to increase students' interest in learning	Jurnal Konseling dan Pendidikan	Zoom, Classroom, WhatsApp,

			during COVID-19 pandemic		
38	Anita Lie*, Siti Mina Tamah, Imelda Gozali, Katari na Retno Triwidayati, Tresiana Sari Diah Utami, Fransiskus Jemadi	2020	SECONDARY SCHOOL LANGUAGE TEACHERS' ONLINE LEARNING ENGAGEMENT DURING THE COVID-19 PANDEMIC IN INDONESIA	Journal of Information Technology Education: Research,	zoom, google classroom, W hatsApp, Google Hangout,
39	Zaid I. Almarzooq, MBBCH, Mathew Lopes, MD, Ajar Kochar, MD	2020	Virtual Learning During the COVID-19 Pandemic A Disruptive Technology in Graduate Medical Education	JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY	zoom, Microsoft Teams, Whatsapp, Facebook,
40	Fayyaz Ahmad Faize & Muhammad Nawaz	2020	Evaluation and Improvement of students' satisfaction in Online learning during COVID-19	Open Praxis	WhatsApp, Google classroom, Zoom, Microsoft Teams,

4 1	Dr Ankuran Dutta*	2020	Impact of Digital Social Media on Indian Higher Education: Alternative Approache s of Online Learning during COVID- 19 Pandemic Crisis	International Journal of Scientific and Research Publications	YouTube, Google Classroom, EasyClass, Skype, Google Classroom, Zoom, Facebook, Twitter, Instagram, Whatsapp, Messenger, Imo, Viber
4 2	Taylan Budur1 & Ahmet Demir2 & Fatih Cura3	2021	University Readiness to Online Education during Covid-19 Pandemic	International Journal of Social Sciences & Educational Studies	zoom, google meet,google hangouts,
4 3	Anne Yates, Louise Starkey, Ben Egerton & Florian Flueggen	2021	High school students' experience of online learning during Covid-19: the influence of technology and pedagogy	Technology, Pedagogy and Education	Zoom, Microsoft teams, Google Classroom
4 4	Tinggui Chen 1,* , Lijuan Peng 1, Xiaohua Yin 1, Jingtao Rong 1, Jianjun Yang 2 and Guodong Cong 3	2020	Analysis of User Satisfactio n with Online Education Platforms in China during the COVID- 19 Pandemic	healthcare MDPI	Zoom, Skype, FaceTime

4 5	Suprianto1, Sitti Hardiyanti Arhas2, Mahmudin3, Ade Onny Siagian4	2020	The Effectiveness of Online Learning Amid the COVID-19 Pandemic	Jurnal Administrare: Jurnal Pemikiran Ilmiah dan Pendidikan Administrasi Perkantoran	zoom, google meet, and google classroom, Whatsapp, Google Classroom, or Webex
4 6	Yuliia Nenko1, Nelia Kybalna2, Yana Snisarenko3	2020	The COVID-19 Distance Learning: Insight from Ukrainian students	Revista Brasileira de Educação do Campo The Brazilian Scientific Journal of Rural Education ARTIGO/ARTICLE/ARTÍCULO	GoogleClass room, e-mail, Viber, Zoom, web site of institution, Messenger, Skype, Google Forms,
4 7	Zakarya Almahasees1 *, Khaled Mohsen2 and Mohammad Omar Amin3	2021	Faculty's and Students' Perceptions of Online Learning During COVID-19	Frontiers in education	Zoom, Microsoft Teams
4 8	Adison Adrianus Sihombing1* , Santi Anugrahsari2 , Nining Parlina3, Yuliana Saridewi Kusumastuti 4	2021	Merdeka Belajar in an Online Learning during The Covid-19 Outbreak: Concept and Implementation	Assian Journal of University education	Google Classroom, Edmodo, Schoology, Whatsapp, Zoom, Microsoft Teams, Facebook, and Instagram
4 9	Herwin Herwin, Agung Hastomo, Bambang Saptono, Amalia Rizki Ardiansyah, Setiawan Edi Wibowo,	2021	How elementary school teachers organized online learning during the Covid-19 Pandemic?	World Journal on Educational Technology: Current Issues	Zoom, Google Meetings, WhatsApp

50	Unger, S., & Meiran,	2020	Student Attitudes Towards Online Education during the COVID-19 Viral Outbreak of 2020: Distance Learning in a Time of Social Distance	International Journal of Technology in Education and Science	Zoom, Canvas lectures,
51	Dr. Wahab Ali	2020	Online and Remote Learning in Higher Education Institutes: A Necessity in light of COVID-19 Pandemic	Higher Education Studies	Zoom, Moodle, Google Meet Meet,
52	Avani Agarwal, Sahil Sharma, Vijay Kumar, and Manjit Kaur	2021	Effect of E-Learning on Public Health and Environment During COVID-19 Lockdown	BIG DATA MINING AND ANALYTICS	Zoom, Teams, Google Classroom, WhatsApp and Google Drive links,
53	Nastaran Peimani 1,* and Hesam Kamalipour 2	2021	Online Education in the Post COVID-19 Era: Students' Perception and Learning Experience	Education sciences MDPI	Zoom

54	Ivan Bakhov 1,*, Natalia Opolska 2, Mira Bogus 3, Viktoriia Anishchenko 4 and Yulia Biryukova	2021	Emergency Distance Education in the Conditions of COVID-19 Pandemic: Experience of Ukrainian Universities	Education sciences MDPI	Skype, Moodle, Zoom, Viber, Telegram, Messenger, Google classroom, Email,
55	Agnieszka Pregowska 1,* , Karol Masztalerz 2 , Magdalena Garlińska 3 and Magdalena Osial	2021	A Worldwide Journey through Distance Education —From the Post Office to Virtual, Augmented and Mixed Realities, and Education during the COVID-19 Pandemic	Education sciences MDPI	Zoom, Google Classroom, Microsoft Teams, D2L, and Edgenuity,
56	R.Radha1, K.Mahalakshmi2, Dr.V.Sathish Kumar3, Dr.AR.Sarav anakumar	2020	E-Learning during Lockdown of Covid-19 Pandemic: A Global Perspective	International Journal of Control and Automation	Zoom, Google classroom, Whatsapp, YouTube, Mail
57	Cristina Pires Camargo* Patricia Zen ,Tempski, Fabio Freitas Busnardo ,III Milton de Arruda Martins ,II	2020	Online learning and COVID-19: a meta-synthesis analysis	Clinics	Zoom, Google Meet, Facebook, Skype

	Rolf Gemperli				
58	Yustina Fitriani ¹ , Murti Bandung ² , Mohtana Kharisma Kadri ³		Students' Perspective of Online Learning on Speaking Class During Covid-19 Pandemic	Journal of Language and Literature	Zoom Cloud Meeting, Google Meet, Cisco Webex,
59	Priyono Tri Febrianto, Siti Mas'udah and Lutfi Apreliana Megasari	2020	Implementation of Online Learning during the Covid-19 Pandemic on Madura Island, Indonesia	International Journal of Learning, Teaching and Educational Research	Zoom, instagram, facebook, Twitter, ebooks
60	Budi Azhari & Iwan Fajri	2022	Distance learning during the COVID-19 pandemic: School closure in Indonesia	International Journal of Mathematical Education in Science and Technology,	WhatsApp, Zoom Meeting applications, Google Classroom with Webex, Discord, Teams
61	Najla Altwaijry, Alnada Ibrahim, Reem Binsuwaidan, Lina I Alnajjar, Bshra A Alsfook & Raghda Almutairi	2021	Distance Education During COVID-19 Pandemic: A College of Pharmacy Experience	Risk Management and Healthcare Policy	Blackboard Collaborate, Teams, Zoom
62	Rini Susilowati	2020	THE CHALLENGE OF ONLINE	Jurnal Elsa,	Zoom, WhatsApp,

			LEARNING IN LISTENING CLASS DURING COVID-19 PANDEMIC		
63	Poorva Gohiya, Ashish Gohiya	2020	E-learning during Covid 19 Pandemic.	Research square	Zoom, Teams,
64	Olasile Babatunde Adedoyin & Emrah Soykan	2020	Covid-19 pandemic and online learning: the challenges and opportunities	Interactive Learning Environments	BigBlueButton, Google classroom
65	Aleksandra Stevanovic1 Radoslav Božić2 Slaviša Radovic3	2021	Higher education students' experiences and opinion about distance learning during the Covid-19 pandemic	Journal of Computer Assisted Learning	LAMS and Moodle, Zoom, Skype, Webex Meetings,
66	Md. H Asibur Rahman, Mohammad Shahab Uddin, Anamika Dey	2020	Investigating the mediating role of online learning motivation in the COVID-19 pandemic situation in Bangladesh	Journal of Computer Assisted Learning	Zoom, Google Hangouts, Skype & Cisco WebEx, Facebook Messenger, WhatsApp)

67	Mohammad S Shawaqfeh1 Abdulkareem M Al Bekairy1,2, Ahmad Al-Azayzih3,4, Abdulmalik A Alkatheri1,2, Amjad M Qandil5, Aiman A Obaidat1, Shemylan Al Harbi1,2 and Suhaib M Muflih4	2020	Pharmacy Students Perception s of Their Distance Online Learning Experience During the COVID-19 Pandemic: A Cross-Sectional Survey Study	Journal of Medical Education and Curricular Development	Backboard and Backboard Collaborate, Zoom, YouTube and Facebook
68	Sumitra Pokhrel1 and Roshan Chhetri2	2021	A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning	Higher Education for the Future	Google Hangouts Meet, Zoom, Slack, Cisco, WebEx, Elias, Moodle, BigBlueButton and Skype, Telegram, Messenger, WhatsApp and WeChat
69	Shivangi Dhawan1,2	2020	Online Learning: A Panacea in the Time of COVID-19 Crisis	Journal of Educational Technology Systems	EdTech start-ups include Byju's, Adda247, Alolearning, AptusLearn, Asmakam, Board Infinity, ClassPlus, CyberVie, Egnify, Embibe, ExtraaEdge, iStar, Jungroo

					Learning, GlobalGyan, Lido Learning, Pesto, Vedantu, Edubrisk, ZOOM Classroom, ZOOM Business, Toppr, Unacademy, Coursera, Kahoot, Seesaw, Khan Academy, e-pathshala, GuruQ, Google Hangouts, Skype, Adobe Connect, Microsoft teams,
70	Abaid Ullah 1, Mahmooda Ashraf 1,2 , Shanza Ashraf 1 and Sajjad Ahmed	2021	Challenges of online learning during the COVID-19 pandemic encountered by students in Pakistan	Journal of Pedagogical Sociology and Psychology	Zoom, google chat,
71	Rasmitadila, Rusi Rusmiati Aliyyah, Reza Rachmadtullah, Achmad Samsudin, Ernawulan Syaodih, Muhammad Nurtanto, Anna Riana	2020	The Perceptions of Primary School Teachers of Online Learning during the COVID-19 Pandemic	Journal of Ethnic and Cultural Studies	WhatsApp, Google Forms, Worksheets, YouTube, and Zoom, Google Classroom, and PowToon

	Suryanti Tambunan		Period: A Case Study in Indonesia		
7 2	Selwa Elfirdoussi ,1 Mohamed Lachgar,2 Hind Kabaili,3 Abdelali Rochdi,4 Driss Goujdami,4 and Larbi El Firdoussi	2020	Assessing Distance Learning in Higher Education during the COVID-19 Pandemic	Hindawi Education Research International	Zoom, Google Classroom, and YouTube, Teams, Moodle
7 2	Mahona Joseph Paschal1 & Demetria Gerold Mkulu1	2020	Online Classes during COVID-19 Pandemic in Higher Learning Institutions in Africa	Global Research in Higher Education	Zoom, WhatsApp.com, Skype.com, Youtube.com, and Google classroom
7 3	John Sandars11, Raquel Correia1, Mary Dankbaar9, Peter de Jong6, Poh Sun Goh2, Inga Hege10, Ken Masters7, So-Young Oh5, Rakesh Patel3, Kalyani Premkumar8, Alexandra Webb12, Martin Pusic4	2020	Twelve tips for rapidly migrating to online learning during the COVID-19 pandemic	MedEdPublish	Skype, TopHat, Zoom, WhatsApp, Slack,

7 4	Rimba Hamid *, Izlan SENTRYO, Sakka Hasan	2020	Online learning and its problems in the Covid-19 emergency period	Jurnal Prima Edukasia	Zoom Cluod Meeting or Google Meet, Microsoft Teams, WhatsApp, You Tube Channel,
7 5	Retno Puji Rahayu* & Yanty Wirza	2020	Teachers' Perception of Online Learning during Pandemic Covid-19	Jurnal Penelitian Pendidikan	Whatsapp, Google Classroom, Ruang Guru, Quipper, Zoom meeting,
7 6	Muhammad Giatman1*, Sri Siswati2, Irma Yulia Basri1	2020	Online Learning Quality Control in the Pandemic Covid-19 Era in Indonesia	175Journal of Nonformal Education	zoom, google met, email, google classroom and Instagram,
7 7	Budi Mulyanti*, Wawan Purnama, Roer Eka Pawinanto	2020	Distance Learning in Vocational High Schools during the COVID-19 Pandemic in West Java Province, Indonesia	Indonesian Journal of Science & Technology	Google Classroom, Zoom, and Webex,
7 8	Sandra Phek-Lin Sim1*, Hannah Phek-Khiok Sim2, Cheng-Sim Quah3	2021	Online Learning: A Post Covid-19 Alternative Pedagogy For University Students	Asian Journal of University Education	Google Classroom, Google Meet, WhatsApp, Telegram, Zoom, Skype,

79	Ria Novianti1*, Meyke Garzia1	2020	Parental Engagement in Children's Online Learning During COVID-19 Pandemic	Journal of Teaching and Learning in Elementary Education	Google Classroom or Zoom, WhatsApp,
80	Andi Wahyu Irawan1, Dwisona1, Mardi Lestari3	2020	Psychological Impacts of Students on Online Learning During the Pandemic COVID-19	Jurnal Bimbingan dan Konseling	Zoom,
81	Henny Mardiah1	2020	The Use of E-Learning to Teach English in the Time of the Covid-19 Pandemic	English Teaching and Linguistics Journal	Zoom, Cloud Meetings, Cisco Webex Meetings, Google Classroom
82	1Sri Ariani, *2Tawali	2021	PROBLEMS OF ONLINE LEARNING DURING COVID-19 PANDEMIC IN SPEAKING FOR PROFESSIONAL CONTEXT CLASS	Journal of English Language Teaching	Google Classroom, ZOOM, Google Meet, Facebook, Youtube
83	Sri Gustiani	2020	STUDENTS' MOTIVATION IN ONLINE LEARNING	HOLISTICS JOURNAL,	Zoom ,Google Meet, Google Meet, Cisco WebEx, and

			G DURING COVID-19 PANDEMIC ERA: A CASE STUDY		Mikogo, WhatsApp
84	Christopher P. Garris and Bethany Fleck	2022	Student Evaluations of Transitioned-Online Courses During the COVID-19 Pandemic	Scholarship of Teaching and Learning in Psychology	Zoom and Teams,
85	Avi Besser, Gordon L. Flett	2022	Adaptability to a Sudden Transition to Online Learning During the COVID-19 Pandemic: Understanding the Challenges for Students	Scholarship of Teaching and Learning in Psychology	Zoom and Google Meet.
86	Madziatul Churiyah; Sholikhan; Filianti; Dewi Ayu Sakdiyyah	2020	Indonesia Education Readiness Conducting Distance Learning in Covid-19 Pandemic Situation	International Journal of Multicultural and Multireligious Understanding	Zoom, Microsoft Team, WhatsApp, Google Classroom, Ruangguru,
87	Beby Masitho Batubara	2021	The Problems of the World of Education in the Middle of the	Budapest International Research and Critics Institute	Zoom, Google Meet, CloudX.Google Classroom, Whatsapp, Smart Class,

			Covid-19 Pandemic		Zenius, Quipper and Microsoft
88	Antonius Setyawan Sugeng Nur Agung1* , Monika Widyastuti Surtikanti2, and Charito A. Quinones, OP3	2020	Students' Perception of Online Learning during COVID-19 Pandemic: A Case Study on the English Students of STKIP Pamane Talino	Jurnal Sosial dan Humaniora [Journal of Social Sciences and Humanities]	Rumah Belajar, Quipper School, Ruang Guru, Google Classroom, Zoom,Whats App
89	Rochyani Lestiyawati , Arif Widyantoro	2020	Strategies and Problems Faced by Indonesian Teachers in Conducting E-Learning System During COVID-19 Outbreak	CLLiENT (Culture, Literature, Linguistics, and English Teaching)	ZOOM, Google Meet, Facebook, and Soon, Whatsapp.
90	Tyler Lazaro, MD,1 Visish M. Srinivasan, MD,1 Maryam Rahman, MD, MS,3 Ashok Asthagiri, MD,4 Garni Barkhoudarian, MD,5 Lola B. Chambless, MD,6 Peter	2020	Virtual education in neurosurgery during the COVID-19 pandemic	Neurosurg Focus	Microsoft Teams, Webex, Zoom,

	Kan, MD,7 Ganesh Rao, MD,1 Brian V. Nahed, MD, MSc,8 and Akash J. Patel, MD1,2,9				
9 1	Hutomo Atman Maulana	2021	Psychological Impact of Online Learning during the COVID-19 Pandemic: A Case Study on Vocational Higher Education	Indonesia Journal of Learning Education and Counseling	Zoom meeting or Google Classroom.
9 2	D. A. Akuratiya*, D. N. R. Meddage	2020	Students' Perception of Online Learning during COVID-19 Pandemic: A Survey Study of IT Students	International Journal of Research and Innovation in Social Science	Zoom, LMS, Google meet,
9 3	Geminastiti Sakkira*, Syarifuddin Dollaha, & Jamaluddin Ahmadb	2021	E-Learning in COVID-19 Situation: Students' Perception	Journal of Education and Learning Innovation	Facebook, WhatsApp, YouTube, LMS, Zoom, Google Classrooms
9 4	Daniel Hermawan	2021	The Rise of E-Learning in COVID-19 Pandemic in Private University: Challenges	International Journal of Recent Educational Research	Google Hangouts Meet, Zoom, Skype, Microsoft Team, Webex Meet

			and Opportunities		
95	Leli Efriana	2021	Problems of Online Learning during Covid-19 Pandemic in EFL Classroom and the Solution	Journal of English Language Teaching and Literature	Zoom meeting, google meet, google classroom, edmodo, WhatsApp
96	Dedi Riyan Rizaldi1*, Zia datul Fatimah2	2020	How the Distance Learning can be a Solution during the Covid-19 Pandemic	INTERNATIONAL JOURNAL OF ASIAN EDUCATION	Zoom Cloud Meeting, Google Forms, Jitsi Meet App, Whatsapp Groups
97	S Famularsih1	2020	Students' Experiences in Using Online Learning Applications Due to COVID-19 in English Classroom	Studies in Learning and Teaching	Zoom, Skype, and WebEx, WhatsApp, Facebook
98	Awal Bahasoan1, Wulan Ayuandiani2, Muhammad Mukhram3 Aswar Rahmat4	2020	Effectiveness of Online Learning In Pandemic Covid-19	International Journal Of Science, Technology & Management	Google class, WhatsApp, zoom, Facebook,
99	Eugene Adu Henaku	2020	COVID-19: Online Learning Experience of College Students: The Case of	International Journal of Multidisciplinary Sciences and Advanced Technology	WhatsApp, Telegram, Zoom, Google meet and Google Classroom

			Ghana		
100	Edmond Kwesi AGORMED AHa Eugene Adu HENAKUb Desire Mawuko Komla AYITTEc Enoch Apori Ansahd	2020	Online Learning in Higher Education During COVID-19 Pandemic: A Case of Ghana	Journal of Educational Technology & Online Learning	zoom, WhatsApp, Google classroom, Blackboard, YouTube/Skype, Google meeting,
101	Uril Bahruddin1*, Suci Ramadhanti Febriani2	2020	Student's perceptions of Arabic online learning during COVID-19 emergency	Journal for the Education of Gifted	Zoom, WhatsApp, YouTube, Google Classroom
102	Prof. Dr. Brikena Khaferi, Prof. Dr. Gëzim Khaferi	2020	ONLINE LEARNING BENEFITS AND CHALLENGES DURING THE COVID 19 - PANDEMIC- STUDENTS' PERSPECTIVE FROM SEEU	SEEU Review	Google Meet or Zoom,

103	Wassnaa Al-Mawee a , * , Keneth Morgan Kwayu b , Tasnim Gharaibeh	2021	Student's perspective on distance learning during COVID-19 pandemic: A case study of Western Michigan University, United States	International Journal of Educational Research Open	WebEx, Zoom, and Microsoft365,
104	T. Muthuprasad a,* , S. Aiswarya b, K.S. Aditya a, Girish K. Jha	2021	Students' perception and preference for online education in India during COVID - 19 pandemic	Social Sciences & Humanities Open	Blackboard, Microsoft Teams, Zoom, WhatsApp,
105	Amer Mahmoud Sindiani a,* , Nail Obeidat a, Eman Alshdaifat b, Lina Elsalem c, Mustafa M. Alwani d, Hasan Rawashdeh a, Ahmad S. Fares d, Tamara Alalawne d, Loai Issa Tawalbeh e	2020	Distance education during the COVID-19 outbreak: A cross-sectional study among medical students in North of Jordan	Annals of Medicine and Surgery	Zoom and Microsoft Teams.,
106	Ahmed Elzainy, MDa, Abir El Sadik, MDa and Waleed Al	2020	Experience of e-learning and online assessment during the	Journal of Taibah University Medical Sciences	Blackboard, Zoom,

	Abdulmone m, PhD		COVID- 19 pandemic at the College of Medicine, Qassim University		
1 0 7	Elizabeth Agyeiwaah a,* Frank Badu Baiden b, Emmanuel Gamor b,c, Fu-Chieh Hsu	2022	Determini ng the attributes that influence students' online learning satisfaction during COVID- 19 pandemic	Journal of Hospitality, Leisure, Sport & Tourism Education	Zoom, Blackboard Collaborate,
1 0 8	Hasnan Baber	2021	Modelling the acceptance of e- learning during the pandemic of COVID- 19-A study of South Korea	The International Journal of Management Education	Zoom
1 0 9	Che Ahmad Azlan a, Jeannie Hsiu Ding Wong a,* Li Kuo Tan a, Muhammad Shahrin Nizam A. D. Huri a, Ngie Min Ung b, Vinod Pallath c, Christina Phoay Lay Tan d, Chai Hong Yeong	2020	Teaching and learning of postgradua te medical physics using Internet- based e- learning during the COVID- 19 pandemic – A case study from	Physica Medica	Zoom, Cisco WebEx, Google Meet, MS Teams, Skype, BigBlueButt on, Jitsi

	e, Kwan Hoong Ng		Malaysia		
1 1 0	Yuk Ming Tang a,g,*, Pen Chung Chen a, Kris M.Y. Law b, C.H. Wu c, Yui-yip Lau d, Jieqi Guan e, Dan He f, G.T.S. Ho c	2021	Comparati ve analysis of Student's live online learning readiness during the coronaviru s (COVID- 19) pandemic in the higher education sector	Computers & Education	Microsoft Teams and Zoom Meeting
1 1 1	Atika Qazi a,*, Javaria Qazi b, Khulla Naseer b,*, Muhammad Zeeshan c, Shiza Qazi d, Olusola Abayomi-Alli e, Ibrahim Said Ahmad f, Mohammad Darwich g, Bandeh Ali Talpur h, Glenn Hardaker a, Usman Naseem i, Shuiqing Yang j, Khalid Haruna k	2021	Adaption of distance learning to continue the academic year amid COVID- 19 lockdown	Children and Youth Services Review	Zoom, Microsoft teams, Google classroom

1 1 2	Atika Qazia,*, Khulla Naseerb,*, Javaria Qazib, Hussain AlSalman, Usman Naseemd, Shuiqing Yange, Glenn Hardakera, Abdu Gumacic	2020	Conventio nal to online education during COVID- 19 pandemic: Do develop and underdevel oped nations cope alike	Children and Youth Services Review	Zoom, MS- Team, Google meeting, WhatsApp and Facebook,
1 1 3	Ghulam Murtaza Rafique a,*, Khalid Mahmood b, Nosheen Fatima Warraich b, Shafiq Ur Rehman	2021	Readiness for Online Learning during COVID- 19 pandemic: A survey of Pakistani LIS students	The Journal of Academic Librarianship	Zoom, Google Meet, Microsoft Teams, Webex
1 1 4	Mahmoud Maqableh a,*, Mohammad Alia b	2021	Evaluation online learning of undergradu ate students under lockdown amidst COVID- 19 Pandemic: The online learning experience and students' satisfaction	Children and Youth Services Review	MS Teams or Zoom, Moodle platform, Facebook, Google classroom, YouTube, Email,

Source: Own compilation

Forced online learning due to the circumstances of COVID-19 came at very unexpected times for many if not all academic institutions all over the world. In such a way both government

and academic institutions had to devise some strategies to save the academic year³³. To achieve this, institutions had to come up with different strategies to ensure continued teaching and learning. The strategies had to cover both the teaching and communication between instructors and learners/students. Anyway, online learning was no longer an option but a compulsory initiative for all. Interesting to note that normal Learner Management Systems such as Blackboard/Blackboard Collaborate were widely . Most remarkable Learning management systems played a major role during Covid 19. Even though these tools were normally used under face to face model or in pre-Covid 19 era, to some extent there was a notable increase in their use. This is confirmed in studies conducted based online learning during Covid 19. For instance, Blackboard.

To save the academic year, teaching and learning still had to take place however the delivery mode moved completely from face-to-face to fully online. Expectedly video conferencing tools, such as Zoom, Microsoft Teams, Google Meet, and Skype etc, mostly caught the attention of academic institutions all over the world. This is because Covid 19 forced everything to be on a standstill, with people being quarantined yet teaching and learning had to carry on to save the academic year. In fact Zoom came out as the mostly used video conferencing tool as per reviewed literature. Zoom was the most used tool as also demonstrated in Table 3 as Zoom is ranked the first among the video conferencing tools that were used during the online learning environment. Noteworthy that there are other video conferencing tools that were used during online learning with the rich literature on the use of Microsoft Teams, see the following but not limited to the mentioned studies. Google Meet also came as one of the used tools to conduct online classes, fascinating to note that Google Meet was not one of the popular video conferencing tools before COVID-19, thanks to COVID-19 some institutions all over the world began to search for solutions for their problem as Google meet was an option. Moreover, YouTube was also used to conduct live online classes, which also helped as YouTube is popular to both instructors and students. YouTube was used to conduct classes live and also to upload the already recorded classes. Skype was also a solution for most institutions, as much as there are not many people around the world who use Skype there are a considerable number of articles that show evidence of the use of this tool.

Social media also played a crucial role, with WhatsApp used as a means of communication.

³³ Maqableh and Alia, "Evaluation Online Learning of Undergraduate Students under Lockdown amidst COVID-19 Pandemic: The Online Learning Experience and Students' Satisfaction"; Yuk Ming Tang et al., "Comparative Analysis of Student's Live Online Learning Readiness during the Coronavirus (COVID-19) Pandemic in the Higher Education Sector," *Computers & education* 168 (July 2021): 104211, <https://pubmed.ncbi.nlm.nih.gov/33879955>.

Notable both instructors and students were using WhatsApp groups to exchange information about the classes, notes etc. Followed by Facebook, which was mostly used for sending messages via messenger. Then, Instagram was also used, but not in most cases as there are few studies that noted the use of this type of social media. Like LinkedIn, Tiltalk was also not that much used social media platform during the pandemic, there is only one study that noted the use of Tiltalk. As noted before, the most notable least-used social media platform was Linked In, with only Aguilera-Hermida ³⁴, noting the use of Linked in his studies about college students' acceptance of online learning during the pandemic. Lastly, among the popular social media platforms, Twitter was also not left out of the picture

Equally important, there are other tools that are not popular that are used in other countries, such as the Internet in general, WebEx, Telegram, Edx and Udemy , Jitsi, Lark and Avaya space, Kahoot, Edmodo , Tapataalk and Convo, DingTalk, Tencent Meeting, Chaoxing, MOOC, TIM, and WeChatWork, Quipper, SPADA System, Elena Platform, UCY Learning, English Discoveries, Email, Skype, and BlogSpot, TrueConf Online, Slack Video Calls- and Lifesize Go, Webex, Tcexam, Moodle, FlexiQuiz, EdBase, Tcexam, Virtualx, ,Citrix Webex, and GoToMeeting , UR Play, Sli, Docebo, WIZIQ, Adobe captivate, Elucidat, TronClass, Classin, and Wechat group platforms, , Rumah Belajar, Cisco, Ruang Guru, Skype, Lainnya, , Imo, Viber, FaceTime, Canvas lectures, Meet Meet, Drive links, D2L, and Edgenuity , Cisco, ebooks, BigBlueButton, EdTech start-ups include Byju's, Adda247, Alolearning, AptusLearn, Asmakam, Board Infinity, ClassPlus, CyberVie, Egnify, Embibe, ExtraaEdge, iStar, Jungroo Learning, GlobalGyan, Lido Learning, Pesto, Vedantu, Edubrisk, Toppr, Unacademy, Coursera, Kahoot, Seesaw, Khan Academy, e-pathshala, GuruQ, Google Hangouts and Adobe Connect, PowToon, Mikogo, Ruangguru, Smart Class, Zenius, Quipper, Rumah Belajar, Quipper School, Ruang Guru, Soon, Jitsi Meet. All these above-mentioned tools were the saving grace during the COVID-19 pandemic period, Institutions all over the world were hugely dependent on them during the unprecedented era of both shutdown and some are still even continuing using them after the pandemic.

Discussion

Without a doubt, without online tools used during Covid 19, the world would have seen an unimaginable disaster in the history of academic space. Commendable to the courtesy of online learning strategies/tools became a saving grace. The table below shows the extent to which each

³⁴ A Patricia Aguilera-Hermida, "College Students' Use and Acceptance of Emergency Online Learning Due to COVID-19," *International journal of educational research open* 1 (2020): 100011, <https://pubmed.ncbi.nlm.nih.gov/35059662>.

online tool was used based on the category. Not all online tools were presented on the table, but the most popular and most used ones were presented. In the same words of Dhawan (2020), Zoom emerged as the clear winner indeed over all the other online strategies, followed by Teams.

Table 3: Online strategy/Tool used during COVID-19 per category.

Category	Online strategy/Tool used	Number of times it appeared in literature
Video Conferencing tools	Zoom	111
	Microsoft Teams	41
	Google Meet	33
	Google Classroom	50
	Skype	26
	Youtube	20
Social Media	WhatsApp	50
	Facebook	28
	LinkedIn	2
	Twitter	5
	Instagram	6
	Telegram	8
	TikTalk	7
Learning Management System Tools	Blackboard	15
	Moodle	20

Source: Author's compilation

As much as there are several tools as highlighted above, there were significant concerns raised relating to both students and teachers/lectures. Some noted the lack of readiness from both learners and teachers, this is going as far as the lack of training provided as online learning was sudden due to a sudden change from face-to-face to online due to the Covid-19 pandemic ³⁵. In the same way, Ambawati et al. ³⁶ note that the majority of science teachers to be precise faced difficulties in managing online learning. Understandable, this may be because some science courses may require physical experiments which COVID-19 deprived everyone of the opportunity to do

³⁵ Mseleku, "A Literature Review of E-Learning and E-Teaching in the Era of Covid-19 Pandemic."

³⁶ Wisanti et al., "Science Online Learning during the Covid-19 Pandemic: Difficulties and Challenges," *Journal of Physics: Conference Series* 1747, no. 1 (2021): 12007, <http://dx.doi.org/10.1088/1742-6596/1747/1/012007>.

it. Anyway, not everything can be done online. Lack of motivation from students (Ambawati et al., 2021). In quest of finding future solutions for another unprecedented crisis both government and universities must get ready as online becomes the only option (Widodo et al., 2020). In the use of online tools, communication becomes key between learners and instructors for online learning to materialise³⁷. In fact, the majority of students find it difficult to use online learning tools. It is interesting to note that as much as there are many online tools available and that have been used elsewhere they should be used with caution as different students react differently to these tools and some may lead to severe disengagement³⁸.

Conclusion

The purpose of the study was to identify the online learning strategies/tools that were used for teaching and learning during the COVID-19 pandemic. To achieve this, a systematic literature review was conducted based on peer-reviewed articles to ensure the quality of the results. It is clear that there is an abundance of online learning tools and academic institutions around the world are spoilt for choices. Video conferencing tools such as Zoom, Teams, Google Meet, Skype, etc, were mostly used to conduct live classes with students and also to record the videos for upload on Learning Management Systems or YouTube. On the other hand, social media played a huge role in maintaining communication between the instructors and the learners/students with WhatsApp coming on top followed by Facebook. As much as these online tools are used, they should be used with caution specifically regarding the training and readiness of both the instructors and the learners/students. This study did not investigate the online learning tools that were used for assessment purposes. Future studies may specifically be done to shed light on the literature on the online tools used for assessments and their effectiveness.

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