A Systematic Literature Review on the Effectiveness of Distance Learning: Problems, Opportunities, Challenges, and Predictions

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Abstract

Distance learning has increased in popularity during the COVID-19 pandemic as a new method for research and learning. However, the implementation of distance learning with management learning systems still faces a problem, namely the difficulty of understanding instructional objectives. Regardless of the pros and cons, the results of literature research suggest that distance education is as effective as face-to-face (traditional) learning in terms of student learning outcomes. The application of distance learning (online learning) has many opportunities to develop rapidly as most academic institutions shift to this model. Improving the quality of distance learning programs poses a real challenge in developing challenging content that does not only cover the curriculum but is also engaging. It is strongly predicted that the application of distance learning will not only be part of the normal learning process but will completely replace the current face-to-face conventional teaching and learning.

Keywords: Covid-19; distance learning; distance learning; systematic review

INTRODUCTION
The crisis due to the COVID-19 pandemic that is currently sweeping the world has caused a change in the paradigm of learning for students in schools. Learning that was originally carried out face-to-face in schools has changed drastically into distance learning (Affouneh et al., 2020; Dhawan, 2020; Favale et al., 2020). Many people have negative perceptions about distance education (learning), given its performance which raises the pros and cons. Distance learning has also faced many challenges historically, such being impersonal and unsatisfactory interactions (Abuhassna & Yahaya, 2018; Affouneh et al., 2020). However, new tools and techniques such as distance learning, web-based learning or courses, and learning management systems make a significant contribution to the distance learning arena and increase student satisfaction (Abuhassna & Yahaya, 2018).

Distance learning at the higher education level is not a new phenomenon in the world of education but may be new for students, teachers, and parents at the primary and secondary education levels. In fact, its popularity has increased during the COVID-19 pandemic as a new method for increasing research and learning audiences. One of the right steps in this situation is to utilize network technology and information technology for the development of a learning system, namely the distance learning model or online learning or e-learning, or online learning model (Dhawan, 2020).

Expanding and increasing the availability of materials and communication technology very rapidly, distance learning courses are on the rise. New learning methods have also been developed (Dhawan, 2020; Gupta & Goplani, 2020; K. Lee, 2020; Mahlangu, 2018). Online learning platforms have the potential to increase student interactivity and engagement, there by contributing to influencing the level of optimism and pessimism of students during distance learning (Kusmaryono, Maharani, & Rusdiantoro, 2020).

As a result of the COVID-19 pandemic from the beginning of 2020 until now in 2021, all students or students and teachers have not been able to do face-to-face learning. In order to prevent the wider spread of COVID-19, several countries are still implementing a distance learning system. The hasty and unavoidable adoption of distance learning presents an unequal and potentially unsatisfactory educational experience and threatens to further discredit distance learning as a viable educational platform (Dhawan, 2020; Gupta & Goplani, 2020; Lee, 2020).

This policy of implementing distance learning

reaps the pros and cons of the community and has the potential for backlash from students, parents, and education observers. Because of its unplanned nature, distance learning is in a crisis situation where students, parents, teachers, and education leaders face many obstacles in its implementation (Affouneh et al., 2020).

Previous distance learning reviews have been conducted by several researchers including Wong et al., who reviewed distance learning articles published between 2006-2016 (Wong et al., 2019). Lee et al., reviewed distance learning articles published between 2014-2016 (Lee et al., 2018). Nortvig et al., Reviewed distance learning articles published between 2014-2017 (Nortvig et al., 2018). Therefore, distance learning problems are very important to be discussed based on theoretical studies and research results that have been conducted by education experts. This literature study is expected to add important information currently developing about distance learning in educational settings during and after the COVID-19 pandemic.

The terms distance education, distance learning, web-based instructional, virtual schools, e-learning, and online learning are all terms that are often used interchangeably to describe the vast and changing non-traditional teaching of today. Summarized from various literature, the researchers define distance learning as learning that uses an internet-based interactive model and a learning management system. They call distance education as formal institution-based education where the learning system is separated by distance and time. An interactive communication system is interwoven through learning management systems to connect students, resources, content, and teachers (instructors) (Abuhassna & Yahaya, 2018; Dhawan, 2020; Khalaf & Zin, 2018; K. Lee, 2020; Mahlangu, 2018; Simonson, Schlosser, & Orellana, 2012; Traxler, 2018; Uziak et al., 2018).

There are four main components to the definition of distance learning, namely (1) to differentiate between distance education and independent learning, institution-based distance education; (2) there is a separation of teachers and students in terms of geography, time, and knowledge to be taught; (3) some form of interactive long-distance telecommunication should be available for students to interact with learning resources and teachers; and (4) emphasize the concept of learning environment and resources that facilitate student learning experiences and encourage learning (Mahlangu, 2018; Simonson et al., 2012).

This researcher aims to review the literature on distance learning which includes (1) identifying the quality and effectiveness of distance learning; (2) Investigate the constraints, opportunities, challenges, and predictions of future distance learning; and (3) provide suggestions for improving the implementation of distance learning.

METHOD
Research Method
The research method in this literature review is designed to use a systematic approach to critically analyze the application of distance learning. According to Dixon-Woods (2008) (as cited in Khalaf & Zin, 2018; Martins & Gorschek, 2016), a systematic literature review is defined as a scientific process governed by a set of explicit and demanding rules oriented towards demonstrating completeness, immunity from bias, and transparency and accountability of techniques and techniques execution. Data collection was done through a Google search to obtain quality articles in online journals. All literature (articles) relevant to distance learning topics are then compared and evaluated for reliable understanding (Khalaf & Zin, 2018). The systematic review process is characterized by the existence of several criteria used to limit the scope of the review (Martins & Gorschek, 2016).

Criteria of Inclusion
The inclusion criteria were developed at the start of the review process involving quantitative and qualitative studies (Raes, Detienne, Windey, & Depaepe, 2019; Smale-Jacobse, Meijer, Helms-Lorenz, & Maulana, 2019). Inclusion criteria are the standards for assessing the weight of a subject in a study that is included in the review and who does not fit the criteria to be excluded from this review.

Table 1
Criteria of inclusion

No.	Criteria	Description
1.	Topic	Papers (journal articles) have discussion topics related to distance learning (online), web-based instruction, distance education (online), online interaction, and e-learning.
2.	Period	The research articles (papers) were published between 2018 and 2020, and relate to the subject being investigated.
3.	Research Base	Papers (articles) cover both quantitative and qualitative empirical studies
4.	Transparency	The research method (previous research) should explicitly indicate sample size, instruments and analysis.
5.	Reliability/ Validity	Study results must be valid and reliable according to the type of research and scientific publications.

The literature search as the basis for this review serves to identify papers that can contribute to achieving the research objectives. Recent findings in the search for this systematic review are limited to papers published in 2018 - 2020. The search for related literature was carried out through the Scopus-indexed

online journal databases (Routledge, Taylor and Francis, Springer, Elsevier), and websites, with keywords: distance learning (online), web-based instruction, distance education (online), distance interaction, and e-learning.

Data Analysis
To obtain a good-quality systematic review, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines are used (Raes et al., 2019). These guidelines consist of checklists and flow charts to improve review reporting.

The literature was identified and screened through five stages: (1) Development of inclusion criteria (see Table 1), to ensure that it is systematically reviewed. Literature that did not fit these criteria was excluded from the review; (2) Search of related literature in online journal databases indexed by Scopus, (Routledge, Taylor and Francis, Springer, Elsevier) and Google Scholar using tracking: titles, abstracts, and keywords referring to distance learning. The studies discussed in this literature were considered to fit the inclusion criteria;

(3) Limitation of findings in literature published in 2018 to 2020; (4) Carry out a wider investigation of the literature that fits the inclusion criteria and is kept for research; (5) Conduct literature analysis to construct critical reviews of distance learning; and (6) Draw conclusions based on the final analysis that has been carried out and validated by the current review.

RESULTS AND DISCUSSIONS
The literature search results obtained a total of 68 papers. The author examines the paper in more detail and confirms whether the article (paper) involves a distance learning arrangement, then categorizes according to the inclusion criteria. Finally, 43 relevant papers were selected based on an estimate of which category was the most dominant (see Table 2). The papers discussed were published in 2018 (12 papers), 2019 (8 papers), and 2020 (23 papers). The paper reviews the application of distance learning at the tertiary education level as much as 70% and at the primary-secondary education level as much as 30%.

Table 2
Distribution of distance learning article publications

Research Areas	Publication Year	Number of Papers	References
Performance of distance learning	2018	4	Mahlangu, V. P. (2018), Mshana, J. A. (2018) Wong, et al.,(2018), Abuhassna, H., & Yahaya, N. (2018)
	2019	3	Muljana, P. S., & Lao, T. (2019), Sugilar. (2019), (Hart et al., 2019)
	2020	11	Favale, T., et al., (2020), Alip et al.,(2020), Affouneh, S.,& Dhawan, S. (2020), Tedja, (2020), Ferraro et al., (2020), Wen & Hua,(2020), Lee, K. (2020). Masterson, M. (2020), Tanis, C. J. (2020), Darling-Hammond, L., et al., (2020), Diehl, W. (2020).
Opportunities, trend, and challenges in education	2018	3	Nortvig, A. M., et al., (2018), Traxler, J. (2018) Palvia et al., (2018)
	2019	5	Paul, J., & Jefferson, F. (2019), Raes, A., et al., (2019), Sadeghi, M. (2019), Wakil et al., (2019), Smale-Jacobse, A. E., et al., (2019),
	2020	5	Anjum, P., et al., (2020), Wang, A. I., & Tahir, R. (2020), Halvoník, D., & Kapusta, J. (2020), Kusmaryono, I., et al., (2020), Walton, P., et al., (2020).
Students' experiences, persistence, and perceptions	2018	5	Abdel-Maksoud (2018), Lee et al., (2018), Au, O. T.-S., Li, K., & Wong, T. M. (2018), Nortvig et al., (2018), Uziak, J., et al., (2018),
	2020	7	Ramel, M. R. B. (2020), Senturk et al., (2020), Gupta, A., & Goplani, M. (2020), Ha & Im, (2020), Lapada, A. A., et al., (2020), Ntombela, S. (2020), Mavroidis, I., & Giossos, Y. (2020).
Total		43	

The effectiveness of implementing a distance learning
In achieving the effectiveness of the application of distance learning, there are 74% of literature research results that state that distance education is as effective as face-to-face (traditional) learning in terms of student learning outcomes. About 12% of the literature study collected indicated that face-to-face learning formats

were more effective, and 14% showed mixed findings.

Indicators of the effectiveness of distance learning can be achieved because there are major improvements in technology, and there is an increasing demand for innovative ways from teachers to deliver learning which has led to changes in learning and teaching methods (Affouneh et al., 2020; Favale et al., 2020; Mahlangu, 2018; Sadeghi, 2019). Electronic

devices are used to keep students in touch with the teacher. This tool provides access to communication between students and teachers anytime, anywhere to bridge gaps and distribute educational materials through distance learning programs (Affouneh et al., 2020; Halvoník & Kapusta, 2020).

Learning environment
Learning environments that are supported by computer tools can stimulate students to explore and reflect well on their knowledge constructs (Mahlangu, 2018; Masterson, 2020). This environment appears to be beneficial in the development of interaction between students, and digital skills in a student-centered inquiry-based learning approach (Masterson, 2020). This investigation shows that technology provides significant benefits for the creation of meaningful interactions (students) by encouraging active social collaboration in digital learning spaces (Bondar et al., 2021; Diehl, 2020). However, distance learning programs may be difficult to apply in laboratory science. The distance learning process cannot reach the full potential of students until students can practice what they are learning (Dhawan, 2020). But they have the opportunity to maximize their real potential through the use of technology (Mahlangu, 2018).

Distance learning problems
Now modern technology is available to support distance learning (online), but for some teachers and students sometimes it creates difficulties. These difficulties are related with modern technology that ranges from download errors, problems with installation, login problems, audio and video problems (Dhawan, 2020), and difficulty understanding instructional objectives are the main obstacles to distance learning (Affouneh, Salha, & Khlaif, 2020). Students find distance learning (online) boring and uninteresting (Au, Li, & Wong, 2018). Student interest and focus on distance learning activities is a problem that needs attention. Often students expect a two-way interaction even though this is difficult to implement (Ha & Im, 2020). Online content is generally theoretical, not enabling students to learn and practice effectively (Darling-Hammond, Flook, Cook-Harvey, Barron, & Osher, 2020). Some students were found to be less ready for certain types of e-learning competencies and academic competencies (Dhawan, 2020). On the other hand, e-learning methods and processes have a very strong influence (Hart et al., 2019). The power of distance learning methods can save us from difficult times such as the COVID-19 pandemic (Lapada, Miguel, Robledo, & Alam, 2020).

In addition, distance learning studies have explored the potential that students generate as a form of interactive formative and summative assessment (Buelow et al., 2018). In online formative assessments, teachers sometimes face obstacles that hinder the integration of information technology and computers (ICT) in their work, including lack of training for teachers, lack of appropriate software and hardware, and lack of administrative assistance (Lajane, 2020).

Advantages and disadvantages of distance learning
Some of the advantages of implementing distance learning are students learning independently, flexibility in space and time (accessible anywhere and anytime), saving time, having access to more materials (Alip et al., 2020; Anjum et al., 2020; Bondar et al., 2021), and distance learning are often cheaper than learning from home to school (Wakil et al., 2019). Students can freely communicate with the teacher, greet classmates, complete study materials, and access the internet (Buelow, et al., 2018; K. Lee, 2020; Paul & Jefferson, 2019).

The distance learning method (e-learning) allows teachers to adjust teaching procedures and processes based on student needs. Teachers can use technology with a combination of audio, video, and text strategies to reach all students and to maintain a human touch to them (Dhawan, 2020). This strategy helps create a collaborative, interactive, and effective learning environment (Lajane, 2020).

The disadvantages of distance learning include: such as isolation, a hard struggle to stay motivated, a lack of face-to-face social interaction, difficulty getting immediate feedback from teachers (Sugilar, 2019), and a need for reliable and continuous technology access (Buelow et al., 2018; Mahlangu, 2018; Muljana & Lao, 2019; Raes, Detienne, Windey, & Depaepe, 2019; Traxler, 2018).

Opportunity
During the COVID-19 pandemic crisis, online learning has many opportunities to develop rapidly as most academic institutions are shifting to this model (Favale, Soro, Trevisan, Drago, & Mellia, 2020; Mahlangu, 2018; Mshana, 2018). Now, academic institutions can take this opportunity by having their teachers teach and students learn via distance learning methods (Walton et al., 2020). Teachers can easily practice technology and design flexible online programs for better student understanding (Tanis, 2020). Teachers can develop innovative pedagogical approaches in this state of panic. The application of distance learning will test educators and students to improve problem-solving skills, critical thinking skills, and adaptability among students (Abdel-Maksoud, 2018).

Challenges
Facilitating distance teaching and learning in an online learning environment poses a number of challenges to adapting distance learning practices during the Covid-19 pandemic (Dhawan, 2020). These challenges range from problems of students, educators, content, internet networks, and the learning environment (Alip et al., 2020; Diehl, 2020; Wong et al., 2019).

The Covid-19 pandemic threatens to reduce the quality of education and deprive students of the right to study. On the other hand, this pandemic brings students to two things, namely: find new ways to learn or they are helpless by this situation (Ferraro et al., 2020; Fidalgo et al., 2020). The condition of the

COVID-19 pandemic is an opportunity for academic institutions to take an active role in overcoming educational problems through the application of distance learning methods (Lapada, Miguel, Robledo, & Alam, 2020). Teachers can design flexible online programs through advanced technology to improve student understanding. Teachers can also apply innovative pedagogical approaches in this state of panic. The application of distance learning will test educators and students to improve problem-solving skills, critical thinking skills, and communication skills among students.

The Role of Educators and Student Learning Experiences

Many experts agree that it is very important to involve the role of teachers to develop their capacity in using new technology in the era of the industrial revolution 4.0 (M. Lee, Yun, Pyka, Won, & Kodama, 2018; Paul & Jefferson, 2019). The skills of these teachers will be useful in developing distance learning approaches that are interactive, engaging, and collaborative (Affouneh, Salha, & Khlaif, 2020). Distance learning in a pedagogical view to enhancing the learning experience (Ramel, 2020; Senturk et al., 2020; Su & Waugh, 2018), retention and understanding of students in the field of science, and also to develop a more scientific frame of mind (Traxler, 2018).

Some literature states that strong educator interactions together with quality learning content are important elements in facilitating student involvement in distance learning (Lajane, 2020). The role and relationship of educators on the dimensions reported in the review literature have a significant effect on student learning offered through the online format (Duyen, 2014; Nortvig, Petersen, & Balle, 2018). This research shows that distance learning communities (online) can help create a sense of connection with fellow learners and build self-confidence in students (Nortvig et al., 2018; Ntombela, 2020), as well as a source for knowledge construction and knowledge growth (Duyen, 2014; Nortvig et al., 2018; Wang & Tahir, 2020).

Predictions

It can be said that technological developments in this digital era cannot be denied or even rejected. The impact has extended from the retail industry to banking to education (Palvia et al., 2018). Therefore, the world of education in the new normal era continues to improve to provide good educational services to students. A distance learning model with an online system was developed and gradually began to be applied.

At the end of this discussion, the authors provide a strong prediction that the application of distance learning, distance education, or e-learning will not only be part of the normal learning process but will completely replace the flow of face-to-face conventional teaching and learning into a new era. The application of the concept of online learning (e-learning) makes education significantly more accessible (Au et al., 2018; Wong et al., 2019). In the future, children can learn anywhere without being bound by physical space, as well as teachers who act as facilitators. The classroom is no longer the only place to learn. The virtual world is a campus where everyone can learn anything.

CONCLUSION AND RECOMMENDATION

This literature study shows that distance education is an effective method in terms of learning outcomes. The effectiveness of distance learning has more to do with who teaches, who is learning, and how the learning interactions are carried out and the support of learning technology. Distance learning will be effective if it is well prepared, in terms of content, learning interaction models, learning media, communication strategies, and learning assessments. Even when properly designed, online learning requires more self-discipline and initiative on the part of student's. However, the implementation of distance learning with management learning systems still faces a problem, namely the difficulty of understanding instructional objectives is the main obstacle to distance learning. Regardless of the pros and cons, the results of literature research suggest that distance education is as effective as face-to-face (traditional) learning in terms of student learning outcomes. The application of distance learning (online learning) has many opportunities to develop rapidly as most academic institutions shift to this model. Improving the quality of distance learning programs is a real challenge that must be realized. Developing challenging content that not only covers the curriculum but engages students as well. It is strongly predicted that the application of distance learning will not only be part of the normal learning process but will completely replace the current face-to-face conventional teaching and learning into a new era.

Suggestions for improvement and enhancement of distance learning, are as follows: (1) When starting lessons, greet all students warmly and kindly to build comfortable learning interactions; (2) Create an atmosphere of interactive discussion with students, by 'sharing' screens to present lessons and encouraging students to ask questions; (3) Record lesson presentation sessions and class discussions then distribute them to students who cannot join during the live session; and (4) Provide flexible space for students to consult to contact you for various questions.

REFERENCES

Abdel-Maksoud, N. (2018). When virtual becomes better than real: Investigating the Impact of a networking simulation on learning and motivation. *International Journal of Education and Practice*, *6*(4), 253–270. https://doi.org/DOI: 10.18488/journal.61.2018.64.253.270

Abuhassna, H., & Yahaya, N. (2018). Students' utilization of distance learning through an interventional online module based on moore transactional distance theory. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(7), 3043–3052. https://doi.org/10.29333/ejmste/91606

Affouneh, S., Salha, S., & Khlaif, Z. N. (2020).

Designing quality e-learning environments for emergency remote teaching in coronavirus crisis. *Interdiscip J Virtual Learn Med Sci*, *11*(2), 1–3.

Alip, A. S. Q., Bagarinao, R. T., Secreto, P. V, & Pamulaklakin, R. L. (2020). Analyzing the role of an online system in reducing learner's transactional time in an open and distance e-learning (ODeL) environment: A landscape connectivity perspective. *International Journal*, *6*(1), 1–14.

Anjum, P., Kazimi, B., & John, S. (2020). Quality assurance in distance education: An issue needs to be resolved on piority bases in Pakistan. *Turkish Online Journal of Distance Education*, *8*(3), 164–173.

Au, O. T.-S., Li, K., & Wong, T. M. (2018). Student persistence in open anddistance learning: success factors and challenges. *Asian Association of Open UniversitiesJournal*, *13*(2), 191–202. https://doi.org/DOI 10.1108/AAOUJ-12-2018-0030

Bondar, I., Gumenyuk, T., Horban, Y., Karakoz, O., & Chaikovska, O. (2021). Distance e-learning in the system of professional development of corporation managers: Challenges of Covid-19. *Journal of Education and E-Learning Research*, *7*(4), 456–463. https://doi.org/10.20448/JOURNAL.509.2020.74.45 6.463

Buelow, J. R., Barry, T., & Rich, L. E. (2018). Supporting learning engagement with online students. *Online Learning Journal*, *22*(4), 313–340. https://doi.org/10.24059/olj.v22i4.1384

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, *24*(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Dhawan, S. (2020). Online learning: A panacea in the time of Covid-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Diehl, W. (2020). Opportunities and change amidst debate, confusion, and challenges in education. *American Journal of Distance Education*, *34*(4), 259. https://doi.org/10.1080/08923647.2020.1853424

Duyen, N. T. (2014). Designing high-level tasks to promote mathematical investigation. *Proceedings of the 7th International Conference on Educational Reform (ICER 2014), Innovations and Good Practices in Education: Global Perspectives 287 Designing*, 287–300.

Favale, T., Soro, F., Trevisan, M., Drago, I., & Mellia, M. (2020). Campus traffic and e-Learning during COVID-19 pandemic. *Computer Networks*, *176*(April). https://doi.org/10.1016/j.comnet.2020.107290

Ferraro, F. V., Ambra, F. I., Aruta, L., & Iavarone, M. L. (2020). Distance learning in the covid-19 era: Perceptions in Southern Italy. *Education Sciences*, *10*(12), 1–10. https://doi.org/10.3390/educsci10120355

Fidalgo, P., Thormann, J., Kulyk, O., & Lencastre, J. A. (2020). Students' perceptions on distance education: A multinational study. *International Journal of Educational Technology in Higher Education*, *17*(1), 1-15. https://doi.org/10.1186/s41239-020-00194-2

Gupta, A., & Goplani, M. (2020). Impact of Covid-19 on educational institutions in India. *TOJDEL: The Online Journal of Distance Education and E-Learning*, *8*(3), 159–163.

Ha, Y., & Im, H. (2020). The role of an interactive visual learning tool and its personalizability in online learning: Flow experience. *Online Learning Journal*, *24*(1), 205–226. https://doi.org/10.24059/olj.v24i1.1620

Halvoník, D., & Kapusta, J. (2020). Framework for e-learning materials optimization. *International Journal of Emerging Technologies in Learning*, *15*(11), 67–77. https://doi.org/10.3991/IJET.V15I11.12721

Hart, C. M. D., Berger, D., Jacob, B., Loeb, S., & Hill, M. (2019). Online learning, offline outcomes: online course taking and high school student performance. *AERA Open*, *5*(1), 1–17. https://doi.org/10.1177/2332858419832852

Khalaf, B. K., & Zin, Z. B. M. (2018). Traditional and inquiry-based learning pedagogy: A systematic critical review. *International Journal of Instruction*, *11*(4), 545–564. https://doi.org/10.12973/iji.2018.11434a

Kusmaryono, I., Maharani, H. R., & Rusdiantoro, A. (2020). Students optimism and pessimism against mathematics learning in the pandemic Covid-19 judging from gender. *Journal of Critical Reviews*, *7*(18), 1841–1850.

Lajane, H. (2020). Formative e-Assessment for Moroccan polyvalent nurses training : Effects and challenges case of the higher institute of nursing and health techniques of Casablanca. *International Journal of Emerging Technologies in Learning*, *15*(14), 236–251.

Lapada, A. A., Miguel, F. F., Robledo, D. A. R., & Alam, Z. F. (2020). Teachers' Covid-19 awareness, distance learning education experiences and

perceptions towards institutional readiness and Challenges. *International Journal of Learning, Teaching and Educational Research*, *19*(6), 127–144. https://doi.org/10.26803/ijlter.19.6.8

Lee, D., Watson, S. L., & Watson, W. R. (2018). Systematic literature review on self-regulated learning in massive open online courses. *Article in Australasian Journal of Educational Technology*, *35*(1), 35-45.

Lee, K. (2020). Who opens online distance education, to whom, and for what? *Distance Education*, *41*(2), 186–200. https://doi.org/10.1080/01587919.2020.1757404

Lee, M., Yun, J. J., Pyka, A., Won, D., & Kodama, F. (2018). How to respond to the fourth industrial revolution, or the second information technology revolution? Dynamic new combinations between technology, market, and society through open innovation. *J. Open Innov. Technol. Mark. Complex*, *4*(21), 1–24. https://doi.org/doi:10.3390/joitmc4030021

Mahlangu, V. P. (2018). The good, the bad, and the ugly of distance learning in higher education. *IntechOpen Trends in E-Learning*, *1*(3), 18–31. https://doi.org/10.1016/j.colsurfa.2011.12.014

Martins, L. E. G., & Gorschek, T. (2016). Requirements engineering for safety-critical systems: A systematic literature review. *Information and Software Technology*, *75*, 71–89. https://doi.org/10.1016/j.infsof.2016.04.002

Masterson, M. (2020). An exploration of the potential role of digital technologies for promoting learning in foreign language classrooms: lessons for a pandemic. *International Journal of Emerging Technologies in Learning (iJET)*, *15*(14), 83-93. https://doi.org/10.3991/ijet.v15i14.13297

Mshana, J. A. (2018). Effectiveness of mobile learning as a means of distance learning in Tanzania. *Huria Journal*, *25*(1), 209–232. https://doi.org/10.1017/CBO9781107415324.004

Muljana, P. S., & Lao, T. (2019). Factor contributing to student retention in online learning and recommended strategies for improvement. *Journal of Information Technology Education: Research, 18*, 19–57.

Naidu, S. (2021). Building resilience in education systems post-COVID-19. *Distance Education*, *42*(1), 1–4. https://doi.org/10.1080/01587919.2021.1885092

Nortvig, A. M., Petersen, A. K., & Balle, S. H. (2018). A literature review of the factors influencing e-learning and blended learning in relation to learning outcome, student satisfaction and engagement. *Electronic Journal of E-Learning*, *16*(1), 45–55.

Ntombela, S. (2020). Teaching and learning support for students with disabilities: Issues and perspectives in open distance e-learning. *Turkish Online Journal of Distance Education*, *21*(3), 18–26. https://doi.org/10.17718/TOJDE.761919

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management*, *21*(4), 233–241. https://doi.org/10.1080/1097198X.2018.1542262

Paul, J., & Jefferson, F. (2019). A comparative analysis of student performance in an online vs. face-to-face environmental science course from 2009 to 2016. *Frontiers in Computer Science*, *1*(7), 1–9. https://doi.org/10.3389/fcomp.2019.00007

Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2019). A systematic literature review on synchronous hybrid learning: gaps identified. *Learning Environments Research*, (123456789). https://doi.org/10.1007/s10984-019-09303-z

Ramel, M. R. B. (2020). Students' readiness for online and distance education at the Nueva Vizcaya State University. *Internaational Journal*, *6*(1), 51–87.

Sadeghi, M. (2019). A shift from classroom to distance learning: Advantages and limitation. *Internasional Journal of Reserach in English Education (IJREE)*, *4*(1), 80–88.

Senturk, S., Duran, V., & Yilmaz, A. (2020). The secondary school students' opinions on distance education. *Journal of Education and E-Learning Research*, *7*(4), 360–367. https://doi.org/10.20448/journal.509.2020.74.360.367

Simonson, M., Schlosser, C., & Orellana, A. (2012). Distance education research: A review of the literature. *Journal of Computing in Higher Education*, *23*(2–3), 124–142. https://doi.org/10.1007/s12528-011-9045-8

Smale-Jacobse, A. E., Meijer, A., Helms-Lorenz, M., & Maulana, R. (2019). Differentiated instruction in secondary education: A systematic review of research evidence. *Frontiers in Psychology*, *10,* n.p. https://doi.org/10.3389/fpsyg.2019.02366

Sugilar. (2019). Teaching mathematics at a distance: Learning from practices at Universitas Terbuka. *Journal of Physics: Conference Series*, *1321*(3), 1-6. https://doi.org/10.1088/1742-6596/1321/3/032081

Su, J., & Waugh, M. L. (2018). Online student persistence or attrition: Observations related to expectations, preferences, and outcomes. *Journal of Interactive Online Learning*, *16*(1), 63–79.

Tanis, C. J. (2020). The seven principles of online learning: Feedback from faculty and alumni on its importance for teaching and learning. *Research in Learning Technology*, *28*(106), 1–25. https://doi.org/10.25304/rlt.v28.2319

Tedja, J. N. (2020). The implementation of distance learning policy during the covid-19 pandemic. *Indonesian Journal of Digital Society*, *1*(2), 18–28.

Traxler, J. (2018). Distance learning—Predictions and possibilities. *Education Sciences*, *8*(1). https://doi.org/10.3390/educsci8010035

Uziak, J., Oladiran, M. T., Lorencowicz, E., & Becker, K. (2018). Students' and instructor's perspective on the use of Blackboard platform for delivering an engineering course. *The Electronic Journal of E-Learning, 16*(1), 1–15. https://doi.org/10.21009/JPI.011.07

Wakil, K., Abdulfaraj, A., Sadula, A., Tofiq, D., & Nawzad, L. (2019). Performance of distance learning compared with face to face learning. *Journal of Educational Science and Technology (EST)*, *5*(1), 1-11. https://doi.org/10.26858/est.v5i1.7952

Walton, P., Byrne, R., Clark, N., Pidgeon, M., Arnouse, M., & Hamilton, K. (2020). Online indigenous university student supports, barriers, and learning preferences. *International Journal of E-Learning & Distance Education*, *35*(2), 1–45.

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning – A literature review. *Computers & Education*, *149*, 1–22. https://doi.org/https://doi.org/10.1016/j.compedu.2020.103818

Wen, K. Y. K., & Hua, T. K. (2020). ESL teachers' intention in adopting online educational technologies during covid-19 pandemic. *Journal of Education and E-Learning Research*, *7*(4), 387–394. https://doi.org/10.20448/journal.509.2020.74.387.394

Wong, J., Baars, M., Davis, D., Van Der Zee, T., Houben, G. J., & Paas, F. (2019). Supporting self-regulated learning in online learning environments and MOOCs: A systematic review. *International Journal of Human-Computer Interaction*, *35*(4–5), 356–373. https://doi.org/10.1080/10447318.2018.1543084