

# Adoption of E-Learning at Higher Education Institutions: A Systematic Literature Review

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## Abstract

The concept of e-learning offers several benefits; however, the effective adoption of e-learning systems at higher education institutes (HEIs) is a relatively new concept and thus a challenging task. The current paper provides a comprehensive review of the extant literature on adopting e-learning systems at HEIs. Using the PRISMA search technique, owing to the widespread adoption of e-learning since 2005, the relevant articles published from 2005 to 2020 are selected. The paper identifies and puts forward the level of compatibility and readiness of students and teachers in adopting e-learning, factors that motivate and hinder the adoption of e-learning respectively, benefits of adopting an e-learning system, and the strategies for implementing e-learning at HEIs. In this realm of COVID-19 and e-learning, this paper also envisages different strategies, policies, and recommendations for effectively implementing e-learning at HEIs.

**Keywords:** E-learning; digital learning; higher education institutions; higher education; ICT in education

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## 1. Introduction

With the continuous development of new and improved Information and Communication Technology (ICT) tools and applications, ICT has changed all aspects of everyday life (Kjellsdotter, 2020). It has drastically changed the way people undertake their personal and professional activities and has transformed the world into a global village wherein there is no geographic barrier for interpersonal and inter-organizational communication (Memon & Meyer, 2017). Similarly, ICT has brought significant reforms with positive effects and introduced a new trend in the education system. Implementation of ICT tools in the teaching-learning process offers a wide range of benefits that collectively lead to a better and more efficient understanding of complex scientific concepts and procedures that are difficult to understand otherwise. Research shows that the adoption of ICT tools in the teaching practices increases the students' learning output, equips students with 21st-century skills of digital literacy, aids in teachers' training, makes the course interesting, and prepares students well for competing in the global marketplace of information-rich society (Sayaf *et al.*, 2021). In addition, incorporating ICT tools in delivering lectures aid teachers in adopting innovative teaching practices and simultaneously enhances learners' curiosity and understanding, resulting in improved learning capacities and personal development (Akçayır *et al.*, 2016; Al Shuaili *et al.*, 2020).

Furthermore, integrating advanced ICT such as simulation and augmented reality in education enables a better understanding of the scientific and complex phenomenon. It thus improves students' understanding as human nature and behavior are inclined to comprehend concrete aspects more readily than abstract ones (Akçayır *et al.*, 2016). Given that the integration of technology enables the modification of human nature and cognition, in the current technological and digital literacy era, ICT tools are often regarded as artificial organs along with the biological ones in the core of human beings that allow the humans to continue transforming the world and also transforming themselves (Hasan *et al.*, 2020; Sánchez-Sordo, 2019). It is believed that for some specific courses, it is challenging to keep students motivated by just delivering lectures in a traditional teaching style. In this way, sometimes, these courses are criticized as overly theoretical, uncreative, and non-innovative. Thus students find it boring and difficult to develop understanding to the level they should do. Therefore, in such instances, it becomes essential and beneficial to aid the lectures with advanced ICT

instruments such as gamification, simulations, scenography, and problem-solving and simulating practices (Erdmann & Torres Marín, 2019; Gerbic, 2011).

Increasingly, the advancements in ICT have introduced the concept of electronic learning (e-learning). E-learning, varyingly termed as virtual learning, online education, digital learning, and distance education (Singh & Thurman, 2019), refers to the teaching-learning process in the online environment. With e-learning, geographic barriers to the sharing of knowledge sharing have dissolved. Thus, it has become a flexible and affordable way of providing quality education to people with limited or no access to education facilities otherwise (Wu *et al.*, 2010). Along with an array of benefits of e-learning, such as flexibility in terms of time and space, widespread sharing of knowledge resources, and support for social mobility, e-learning brings considerable challenges as well. The key challenges include the absence of a traditional classroom environment, lack of teacher's control, unavailability of adequate ICT facilities (e.g., computers, internet connectivity), and shortage of financial resources for the ICT implementation (Tarhini *et al.*, 2014). The problems in implementing an e-learning system become even more in developing countries because of insufficient infrastructure. Thus such countries are generally lagging in the race of e-learning adoption.

During the current scenario of a global pandemic of COVID-19, whereby the usual routine is disturbed in all sectors, the education sector has moved away from its regular operations. Many parts of the world are experiencing complete or partial lockdown. At the same time, education institutions are closed, examinations are suspended, the teaching-learning process is interrupted, and students are deprived of learning due to restricted mobility. In such circumstances, it has become a need of the hour to envisage and discover the solutions that can help overcome the education loss and prepare the teachers and students for such situations arising in the future. As the pandemic was sudden and education stakeholders were unprepared for such a situation, it has been challenging to adopt any alternative education system such as e-learning. However, the developed countries with ample ICT resources and technology-based society have been much able to resume their educational activities early in the pandemic without facing any significant obstacles or technological transformations. However, the developing countries lacking enough resources for this sudden shift to online mode face substantial issues in resuming their academic activities. Sooner or later, many have now

switched to online mode to some level, but still, they are struggling with turning this into a very smooth, effective, and fruitful way.

In this realm, this paper undertakes a systematic review of the extant literature on e-learning to understand the opportunities and challenges for adopting an e-learning system and envisage different strategies, policies, and recommendations for effectively implementing e-learning at higher levels education institutions. As a result, the paper offers a comprehensive guide for the government, administrators, and other education policymakers for conceptualizing, implementing, evaluating, and improving the e-learning systems at higher education institutions. The remainder of this paper is structured as follows. Section 2 explains the methodological approach of this study. The results of the review are presented in section 3. The findings are further discussed in section 4, and the paper is concluded in section 5.

## 2. Methodological Approach

### 2.1. Search Strategy

The searching of relevant literature was carried out following the systematic literature search methods employed in existing review articles (e.g., Paul & Criado, 2020; Paul *et al.*, 2021; Williams *et al.*, 2020). The search process began with the identification of relevant journals. The database used for searching the relevant journal and related articles was Scopus. The search for relevant journals was performed first rather than directly exploring the pertaining literature to confine the study scope to some journals with high scores. The journal search yielded 18 relevant journals, then screened and filtered their respective journal scores and citation percentage. As a result, three journals with good scores (i.e., one or near one) were selected. Table 1 presents the details of three selected journals included in this study.

Subsequently, the selected journals were searched for relevant articles published from 2005 to 2020, owing to the widespread adoption of e-learning since 2005. The Scopus database was searched using the Publish or Perish software. The search keywords used for searching relevant articles were ‘e-learning in higher education institutes,’ ‘effective e-learning,’ ‘e-learning,’ and ‘technology in learning.’ All results were limited to the English language only.

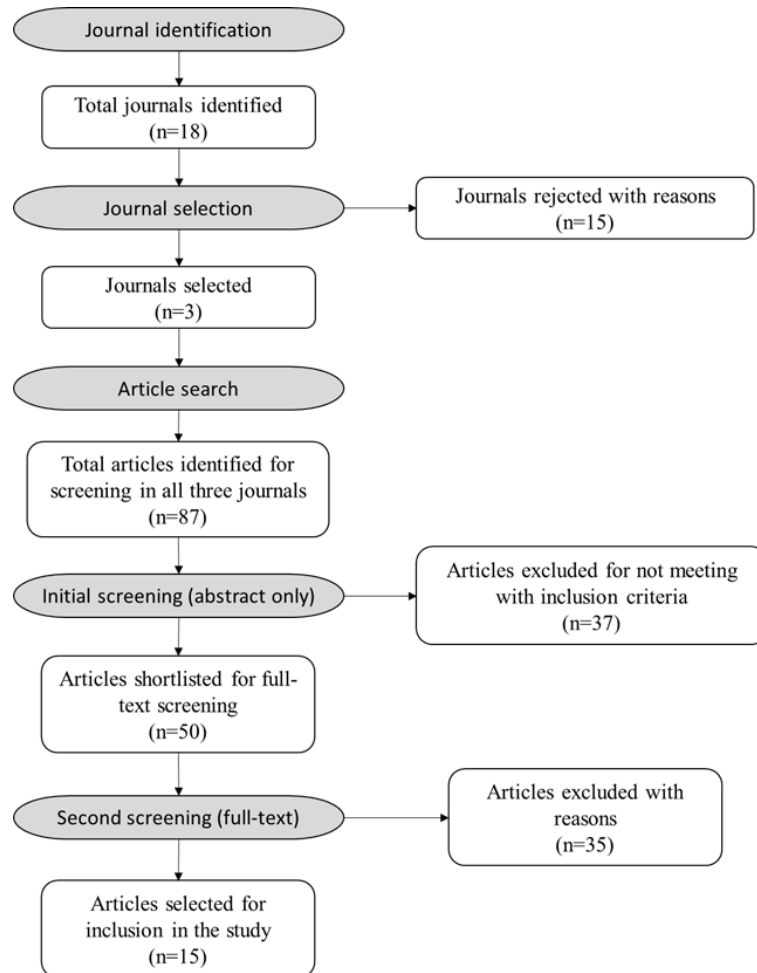
**Table 1** - Selected journals for inclusion in the review

Journal title	Database source	Cite score	Percentage cited
International journal of educational technology in higher education <a href="https://educationaltechnologyjournal.springeropen.com/">https://educationaltechnologyjournal.springeropen.com/</a>	Scopus	2.77	71%
Australasian Journal of educational technology <a href="https://ajet.org.au/index.php/AJET">https://ajet.org.au/index.php/AJET</a>	Scopus	2.13	80%
International journal of emerging technologies in learning <a href="https://online-journals.org/index.php/i-jet">https://online-journals.org/index.php/i-jet</a>	Scopus	0.97	45%

## 2.2. Inclusion and Exclusion Criteria

The initial search with the keywords mentioned above yielded 87 possibly relevant articles that were successively screened and filtered for inclusion in this study based on four criteria: a) the article must be a peer-reviewed article published in one of the three selected relevant journals, b) the article must be in English language, c) the article must be published between 2005 and 2020, and d) the article must discuss e-learning as a central topical theme. The screening is done by going through abstracts only, and as a result, 50 articles were shortlisted. Following this, full text of these identified articles was retrieved.

Subsequently, the second screening of these articles was done based on full text concerning the four inclusion criteria. The articles were excluded if they did not meet the inclusion criteria in their abstract, results, or discussion section. As a result of this screening, 15 articles were finally selected to be included in the review. The general search and screening process of the study is illustrated in Figure 1.



**Figure 1.** Overall article search and screening process of the study

## 2.2. Data Analysis

Following the search and selection of relevant literature for the review, the next step involved undertaking thematic analysis of identified articles. To do so, a well-organized way was employed, similar to Fereday and Muir-Cochrane (2006). Accordingly, the data were extracted, summarized, and recorded in the spreadsheet. Subsequently, the main themes regarding the broad concept of e-learning were identified. The study identified five different themes that these articles are dealing with; i.e., students' compatibility with e-learning (5 included articles), teachers' compatibility with e-learning (2 included articles), factors motivating the adoption of e-learning environment (7

included articles), factors hindering the adoption of e-learning environment (3 included articles), and strategies for implementing effective e-learning (5 included articles). It is essential to mention that a particular article was found dealing with more than one central theme. Table 2 provides details of the selected papers regarding study details, the number of citations, and the central theme that the study is focused on.

**Table 2** - Details of the articles included in the study

S.No.	Study	No. of citations (as of May, 2020)	Main theme
1	<a href="#">Kennedy et al. (2008)</a>	1590	- Students' compatibility with e-learning
2	<a href="#">Mtebe and Raphael (2018)</a>	42	- Factors motivating e-learning environment
3	<a href="#">(Al-Azawei et al., 2017)</a>	106	- Students' compatibility with e-learning - Teachers' compatibility with e-learning
4	<a href="#">Birch and Burnett (2009)</a>	193	- Factors motivating e-learning environment - Strategies for implementing effective e-learning
5	<a href="#">Holt et al. (2013)</a>	24	- Strategies for implementing effective e-learning
6	<a href="#">Kasim and Khalid (2016)</a>	105	- Strategies for implementing effective e-learning
7	<a href="#">Naveed et al. (2017)</a>	52	- Factors hindering the adoption of e-learning
8	<a href="#">Huda et al. (2018)</a>	142	- Factors motivating e-learning environment - Big data
9	<a href="#">Kamba (2009)</a>	78	- Factors hindering the adoption of e-learning - Strategies for implementing effective e-learning
10	<a href="#">El-Seoud et al., 2014</a>	104	- Factors motivating e-learning environment - Students' compatibility with e-learning
11	<a href="#">(Ngampornchai &amp; Adams, 2016)</a>	88	- Students' compatibility with e-learning

12	Ibrahim and Nat (2019)	19	- Teachers' compatibility with e-learning - Factors motivating e-learning environment
13	(Kim <i>et al.</i> , 2019)	27	- Factors motivating e-learning environment
14	Lange and Costley (2020)	5	- Factors hindering the adoption of e-learning - Strategies for implementing effective e-learning
15	Pham <i>et al.</i> (2019)	45	- Students' compatibility with e-learning - Factors motivating e-learning environment

### 3. Results

#### 3.1. Factors motivating e-learning environment

Studies have found that e-learning systems such as Moodle, Sakai, and Blackboard are widely used as a new teaching method in HEIs (Costa *et al.*, 2012; Ouatik & Ouatik, 2021). e-learning is the software for managing the online distribution of knowledge (Islam & Azad, 2015; Moore *et al.*, 2011). The key features of e-learning, including online discussions, chatrooms, online quizzes, polls, and more access to educational content, are the main reasons students' increasing interest in this new technology (Grimus, 2020).

The study conducted at Carnegie Mellon University revealed that e-learning techniques result in better academic performance of students. While stressing the importance of e-learning, it is suggested that online classrooms make the student-teacher relationship more formal and less personal. This can reduce the chances of nepotism and favoritism that might occur otherwise in the traditional classroom, and hence this can motivate institutions to adopt more e-learning technologies. While discussing the global pressure of e-learning technologies, Bates (2005) posits that technological advancement is crucial for higher education institutes to compete internationally. Therefore it would not be illogical to state that one of the significant factors that motivate HEIs to adopt distance learning technologies is the international pressure. Wu *et al.* (2010) assert that the considerable benefits of using e-learning technologies are the flexibility and accessibility of the information. Other motivators behind using e-learning technologies is identified as saving learning



time and efforts, promoting students' intellectual abilities and skills, improving teacher-student interaction, and expanding students' knowledge (Al-Azawei *et al.*, 2017).

### 3.2. Students' compatibility with e-learning

As the world is moving towards digitalization at a breakneck pace, it is indispensable for every person to get hands-on the technology. Particularly, the students belonging to the new generation are surrounded by digital gadgets like computers, mobile phones, video games, etc. (Cha *et al.*, 2020). These young students exposed to technology every moment are becoming pro at using the technology and can actively reap the benefits of e-learning tools. Khan and Umair (2017) mentioned that students (termed as Digital Natives) are gradually utilizing the technology for educational purposes due to their exposure to digital gadgets daily. It can be concluded that students are at ease while using e-learning tools and can easily manage to get through the distance learning technology. At the same time, students can easily use general technologies but find difficulties in using specialized technologies (Jones *et al.*, 2010). It was revealed in the study that although students are pretty tech-savvy, they still feel less comfortable while using technology in the classroom.

Similarly, Kennedy *et al.* (2008) also revealed that students' inclination towards general technology does not reflect their willingness or expertise in using e-learning tools. Comparing these studies with some relatively recent studies (e.g., Al-Taweel *et al.*, 2021; Popoola & Olajide, 2021) (it can be suggested that this impact is positive vice versa, as claimed in these recent studies that using the e-learning tools enhances students' computer expertise. While discussing factors contributing towards students' satisfaction from using e-learning, a survey by Pham *et al.* (2019) conducted in Vietnam suggests that e-learning system quality, e-learning instructor and course material quality, and e-learning administrative support quality enhance the students' satisfaction with the e-learning system. With the advancement in technology, students are getting more compatible with the e-learning environment. If an effective way of utilizing the media and technology is employed, it can contribute to the better cognition of the students (Mayer, 2014).

### 3.3. Teachers' perception of e-learning

Since we are moving from the teacher-centered model of learning to the learner-centered model, we need to empower the teachers more in every manner. To implement the e-learning system

effectively at HEIs, it is necessary to take the teachers on board. Rasheed *et al.* (2020) posits that if a blended learning system (including e-learning and traditional learning) is used, it can help the HEIs function better cost-effectively. According to a study by Birch and Burnett (2009), while teaching through distance learning systems, teachers find it challenging to cater to the needs of Generation Y students, second language students, and students with disabilities. In a qualitative study by Leo *et al.* (2021), teachers claimed that they had put an extra effort while teaching through e-learning systems during the recent pandemic of COVID-19 and have to teach the students how to utilize these tools matching their principal learning style. The teachers further stated in a study that effective implementation of e-learning could only be achieved when students are thoroughly trained regarding the use of the technology being employed by HEIs (Birch & Burnett, 2009).

### 3.4. Barriers affecting the implementation of e-learning

The e-learning methodology of teaching is gradually gaining the edge, and soon its prevalence will surpass the traditional teaching methodology. Still, there are specific barriers that are affecting the successful implementation of e-learning systems. These barriers are manifold; barriers from the students' side, instructors', institutional, and technological barriers. Studies (Mehall, 2021; Wu *et al.*, 2010) have shown that the absence of face-to-face interaction and lack of classroom environment are the major obstacles that hinder the successful implementation of e-learning systems. Similarly, a study (Naveed *et al.*, 2017) conducted on HEIs in Saudi Arabia identified 16 significant obstacles affecting e-learning systems' implementation. The instructors' barriers included the lack of ICT skills, e-learning knowledge, resistance to change, lack of time to develop e-learning courses and motivation. The obstacles related to technology and infrastructure included inappropriate infrastructure, low bandwidth internet, and lack of technical support. The barriers related to management included the lack of financial support, e-learning training, inadequate policies, and instructional design; while the obstacles from the students' side included the lack of ICT skills, e-learning knowledge, proficiency in the English language, and motivation.

Another study (Kamba, 2009) also proposes somewhat similar barriers towards the implementation of e-learning. It posits that lack of trained instructors in terms of ICT and lack of technical support hinder effective e-learning systems. These barriers have a more severe effect on e-learning implementation when it comes to developing countries. Olum *et al.* (2020) conducted a

study in Uganda universities that attributed the less popularization of e-learning to a low level of awareness regarding e-learning, low computer literacy, the huge financial cost of implementation, and severe connectivity issues. While, students in Pakistani universities face challenges of low proficiency in the English language, cultural beliefs, and students' inadequate access to the internet and computer (Ahmed *et al.*, 2017; Mumtaz *et al.*, 2021). This low proficiency in the English language and lower technological skills result in a lack of self-motivation among students regarding using e-learning systems. Students' low confidence in using technology might also be why students' low motivation to adopt e-learning and ultimately become an obstacle in implementing e-learning systems at HEIs (Abou El-Seoud *et al.*, 2014; Maldonado *et al.*, 2011).

### 3.5. Strategies, policies, and procedures for implementing effective e-learning

The barriers hindering the successful implementation of e-learning are almost common among all the regions. A lot of research has been conducted to identify the solutions to overcome these barriers or challenges. Some studies (e.g., Au *et al.*, 2019; Panda & Mishra, 2007; Saeed Al-Marouf *et al.*, 2021) mentioned the absence of comprehensive strategic plans, policies, and procedures was the reason behind the lack of distance learning popularity. Hence, there is a need for formulating effective strategies for the successful implementation of the e-learning system. Birch and Burnett (2009) suggest that the management at HEIs needs to design clear strategic plans, policies, and procedures that mainly address the issues related to e-learning adoption. One of the most critical concerns while formulating the strategies for e-learning is the selection of suitable e-learning systems that the institute is going to install. The essential characteristics that need to be considered are accessibility, ease to operate, flexibility, and user-friendliness (Kasim & Khalid, 2016). The study further suggested that the selection of e-learning systems must be based on the learning skills tools, communication tools, and productivity tools that the particular system offers. It is important to identify the strategies to popularize the e-learning system usage among university students and thereby enhance their satisfaction. Mtebe and Raphael (2018) also suggested that the system quality and the instructor quality play a crucial role in improving learners' satisfaction in an e-learning system. Therefore, the e-learning strategic development process must include decisions related to the primary system needs of the institute. Learning is not a one-way process; for the successful implementation of e-learning, the students need to be well trained and motivated enough. To enhance

the student's awareness and interest regarding e-learning, self-regulatory learning strategies need to be employed (Richardson *et al.*, 2012). Kamba (2009) also suggested conducting training and tutorials to train and aware students regarding the efficient utilization of e-learning. Along with training the students, teachers must look out for the factors that can motivate students to use e-learning. Maldonado *et al.* (2011) suggest that teachers should assess students' motivation for using e-learning technology through an online form and formulate the strategies accordingly for enhancing their motivation.

Holt *et al.* (2013) stress that to bring effectiveness in an online learning environment at HEIs, continuous change in the system following the external and the internal environment is necessary. This study conducted by five Australian universities suggested that an outdated system can deteriorate the entire distance learning environment. Hence, an improvement continually needs to be carried out to manage the e-learning system's quality effectively. Similarly, while stressing advancement in learning technology, Kobusińska *et al.* (2018) and Huda *et al.* (2018) also suggested using big data technology in HEIs will provide students with a more interactive online learning environment. Ultimately, students will be able to make the most of online learning resources.

While one of the most recent papers on e-learning topics (i.e., Lange & Costley, 2020) suggests that improving the quality of media used in delivering online lectures can help in the successful implementation of e-learning. Putting it together, most of the papers reviewed in the present study extend that the quality of the e-learning system being used affects the efficiency and effectiveness of the distance learning environment. Therefore, the management of HEIs must give due diligence towards the quality of the system they are using and must train their staff and the students regarding its use.

#### 4. Discussion and Proposed Research

Today, when we are trying to digitize everything along with our education system, it is high time to put extra effort into improving our technology. Particularly, when it comes to the dissemination of knowledge, the use of technology has become indispensable. While discussing the importance of e-learning, we must include the current pandemic situation in our discussion due to its massive disruption. The outbreak of coronavirus or COVID-19 has confined everyone to their homes,

including the students. This situation has further highlighted the importance of e-learning or distance learning (Al-Okaily *et al.*, 2020; Alqahtani & Rajkhan, 2020; Azlan *et al.*, 2020). Students are taking online lectures and taking online exams and have cleared the semesters from higher education institutions.

Overall, the papers under consideration in this review article suggest that distance learning is a modern and beneficial way of teaching students. It helps save time, provides flexibility to students who cannot physically attend the institutions or who cannot attend at some particular time, provides flexibility in teaching methods, provides access to more information and knowledge, etc. Meanwhile, the online learning system has its drawbacks as well if it is not implemented correctly. Mainly, when it comes to the developing countries, the problems of low internet bandwidth, non-availability of internet and even computers, low computer literacy rate, and low English language proficiency make the situation even worse. But, still, the current scenario has compelled even these countries to opt for the online learning system. Academic leaders' role as knowledge-oriented is highly important for information sharing for better implementation of quality education (Sahibzada *et al.*, 2021).

Given the literature review conducted and the current situation, some literature gaps are identified. It was found that a lot of research has been undertaken on barriers faced by the students taking online classes in developing countries, and those barriers were compared with those of developed countries. But no research until now has been undertaken where obstacles faced by the students following their characteristics are compared. Therefore, it is recommended to conduct a study that may explore the comparative barriers faced by the working students in taking online classes versus the obstacles faced by the students who are not working and are taking online courses. Similarly, comparative studies can also be conducted based on other students' characteristics. For instance, students living in rural areas versus students living in urban areas, students having proficiency in the English language versus students having low ability in the English language, and likewise.

## 5. Conclusion

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Based on the previous studies, it can be concluded that e-learning is the future of higher education institutions. All the stakeholders will be reaping benefits from this particular use of technology. Institutions can save resources and time and promote creativity by adequately utilizing the saved resources and time. Similarly, students can get the benefits of time flexibility, more access to information, and can manage both studies and work more efficiently in case they are working students. Instructors can deliver lectures from their homes, benefit from time flexibility, and introduce innovative learning methods to the students.

For the successful implementation of e-learning, the management of the institutions must take timely and wise measures. Training staff and students regarding the usage of e-learning systems are important for motivating students and teachers to accept and use this new technological breakthrough. It is significant to have a sound and user-friendly e-learning system installed at their institutions and maintain and update the system's quality.

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## References

- Abou El-Seoud, M. S., Taj-Eddin, I. A., Seddiek, N., El-Khouly, M. M., & Nosseir, A. (2014). E-learning and students' motivation: A research study on the effect of e-learning on higher education. *International Journal of Emerging Technologies in Learning*, 9(4), 20-26. <https://doi.org/10.3991/ijet.v9i4.3465>
- Ahmed, S. S., Khan, E., Faisal, M., & Khan, S. (2017). The potential and challenges of MOOCs in Pakistan: a perspective of students and faculty. *Asian Association of Open Universities Journal*. <https://doi.org/10.1108/AAOUJ-01-2017-0011>
- Akçayır, M., Akçayır, G., Pektaş, H. M., & Ocak, M. A. (2016). Augmented reality in science laboratories: The effects of augmented reality on university students' laboratory skills and attitudes toward science laboratories. *Computers in Human Behavior*, 57, 334-342. <https://doi.org/10.1016/j.chb.2015.12.054>
- Al-Azawei, A., Parslow, P., & Lundqvist, K. (2017). Investigating the effect of learning styles in a blended e-learning system: An extension of the technology acceptance model (TAM). *Australasian Journal of Educational Technology*, 33(2). <https://doi.org/10.14742/ajet.2741>
- Al-Okaily, M., Alqudah, H., Matar, A., Lutfi, A., & Taamneh, A. (2020). Dataset on the Acceptance of e-learning System among Universities Students' under the COVID-19 Pandemic Conditions. *Data in brief*, 32, 106176. <https://doi.org/10.1016/j.dib.2020.106176>

- Al-Taweel, F. B., Abdulkareem, A. A., Gul, S. S., & Alshami, M. L. (2021). Evaluation of technology-based learning by dental students during the pandemic outbreak of coronavirus disease 2019. *European Journal of Dental Education*, 25(1), 183-190. <https://doi.org/10.1111/eje.12589>
- Al Shuaili, K., Al Musawi, A. S., & Hussain, R. M. (2020). The effectiveness of using augmented reality in teaching geography curriculum on the achievement and attitudes of Omani 10th Grade Students. *Multidisciplinary Journal for Education, Social Technological Sciences*, 7(2), 20-29. <https://doi.org/10.4995/muse.2020.13014>
- Alqahtani, A. Y., & Rajkhan, A. A. J. E. s. (2020). E-learning critical success factors during the covid-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. 10(9), 216. <https://doi.org/10.3390/educsci10090216>
- Au, O. T.-S., Li, K., & Wong, T. (2019). Student persistence in open and distance learning: success factors and challenges. *Asian Association of Open Universities Journal*. <https://doi.org/10.1108/AAOUJ-12-2018-0030>
- Azlan, C. A., Wong, J. H. D., Tan, L. K., Huri, M. S. N. A., Ung, N. M., Pallath, V., Tan, C. P. L., Yeong, C. H., & Ng, K. H. (2020). Teaching and learning of postgraduate medical physics using Internet-based e-learning during the COVID-19 pandemic—A case study from Malaysia. *Physica Medica*, 80, 10-16. <https://doi.org/10.1016/j.ejmp.2020.10.002>
- Bates, A. T. (2005). *Technology, e-learning and distance education*: Routledge.
- Birch, D., & Burnett, B. (2009). Bringing academics on board: Encouraging institution-wide diffusion of e-learning environments. *Australasian Journal of Educational Technology*, 25(1). <https://doi.org/10.14742/ajet.1184>
- Cha, H., Park, T., & Seo, J. J. S. (2020). What should be considered when developing ICT-integrated classroom models for a developing country? , 12(7), 2967.
- Costa, C., Alvelos, H., & Teixeira, L. (2012). The use of Moodle e-learning platform: a study in a Portuguese University. *Procedia Technology*, 5, 334-343. <https://doi.org/10.1016/j.protcy.2012.09.037>
- Erdmann, A., & Torres Marín, A. J. (2019). Can we improve academic performance and student satisfaction without additional time cost for teachers? Evidence from a blended methodology in Microeconomics. *Multidisciplinary Journal for Education, Social Technological Sciences*, 6(2), 54-91. <https://doi.org/10.4995/muse.2019.11869>
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods*, 5(1), 80-92. <https://doi.org/10.1177/160940690600500107>
- Gerbic, P. (2011). Teaching using a blended approach—what does the literature tell us? *Educational Media International*, 48(3), 221-234. <https://doi.org/10.1080/09523987.2011.615159>
- Grimus, M. (2020). Emerging technologies: Impacting learning, pedagogy and curriculum development. In *Emerging technologies and pedagogies in the curriculum* (pp. 127-151): Springer.
- Hasan, R., Palaniappan, S., Mahmood, S., Abbas, A., Sarker, K. U., & Sattar, M. U. (2020). Predicting student performance in higher educational institutions using video learning analytics and data mining techniques. *Applied Sciences*, 10(11), 3894. <https://doi.org/10.3390/app10113894>



- Holt, D., Palmer, S., Munro, J., Solomonides, I., Gosper, M., Hicks, M., Sankey, M., Allan, G., & Hollenbeck, R. (2013). Leading the quality management of online learning environments in Australian higher education. *Australasian Journal of Educational Technology*, 29(3). <https://doi.org/10.14742/ajet.84>
- Huda, M., Maseleno, A., Atmotiyoso, P., Siregar, M., Ahmad, R., Jasmi, K., & Muhamad, N. (2018). Big data emerging technology: insights into innovative environment for online learning resources. *International Journal of Emerging Technologies in Learning*, 13(1), 23-36. <https://doi.org/10.3991/ijet.v13i01.6990>
- Ibrahim, M. M., & Nat, M. (2019). Blended learning motivation model for instructors in higher education institutions. *International Journal of Educational Technology in Higher Education*, 16(1), 1-21. <https://doi.org/10.1186/s41239-019-0145-2>
- Islam, A. N., & Azad, N. (2015). Satisfaction and continuance with a learning management system: Comparing perceptions of educators and students. *The International Journal of Information Learning Technology*. <https://doi.org/10.1108/IJILT-09-2014-0020>
- Jones, C., Ramanau, R., Cross, S., & Healing, G. (2010). Net generation or Digital Natives: Is there a distinct new generation entering university? *Computers Education*, 54(3), 722-732. <https://doi.org/10.1016/j.compedu.2009.09.022>
- Kamba, M. (2009). Problems, challenges and benefits of implementing e-learning in Nigerian universities: An empirical study. *International Journal of Emerging Technologies in Learning*, 4(1), 66-69. <https://doi.org/10.3991/ijet.v4i1.653>
- Kasim, N. N. M., & Khalid, F. (2016). Choosing the right learning management system (LMS) for the higher education institution context: A systematic review. *International Journal of Emerging Technologies in Learning*, 11(6). <http://dx.doi.org/10.3991/ijet.v11i06.5644>
- Kennedy, G. E., Judd, T. S., Churchward, A., Gray, K., & Krause, K.-L. (2008). First year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology*, 24(1). doi:<https://doi.org/10.14742/ajet.1233>
- Khan, A. A., & Umair, S. (2017). *Handbook of research on mobile devices and smart gadgets in K-12 education*: IGI Global.
- Kim, H. J., Hong, A. J., & Song, H.-D. (2019). The roles of academic engagement and digital readiness in students' achievements in university e-learning environments. *International Journal of Educational Technology in Higher Education*, 16(1), 1-18. <https://doi.org/10.1186/s41239-019-0152-3>
- Kjellsdotter, A. (2020). What matter (s)? A didactical analysis of primary school teachers' ICT integration. *Journal of Curriculum Studies*, 52(6), 823-839. <https://doi.org/10.1080/00220272.2020.1759144>
- Kobusińska, A., Leung, C., Hsu, C.-H., Raghavendra, S., & Chang, V. (2018). Emerging trends, issues and challenges in Internet of Things, Big Data and cloud computing. In: Elsevier.
- Lange, C., & Costley, J. (2020). Improving online video lectures: learning challenges created by media. *International Journal of Educational Technology in Higher Education*, 17(1), 1-18. <https://doi.org/10.1186/s41239-020-00190-6>
- Leo, S., Alsharari, N. M., Abbas, J., & Alshurideh, M. T. (2021). From Offline to Online Learning: A Qualitative Study of Challenges and Opportunities as a Response to the COVID-19 Pandemic



- in the UAE Higher Education Context. *The Effect of Coronavirus Disease on Business Intelligence*, 334, 203. [http://doi.org/10.1007/978-3-030-67151-8\\_12](http://doi.org/10.1007/978-3-030-67151-8_12)
- Maldonado, U. P. T., Khan, G. F., Moon, J., & Rho, J. J. (2011). E-learning motivation and educational portal acceptance in developing countries. *Online Information Review*. <https://doi.org/10.1108/14684521111113597>
- Mayer, R. E. (2014). Multimedia instruction. In *Handbook of research on educational communications and technology* (pp. 385-399): Springer.
- Mehall, S. (2021). Purposeful interpersonal interaction and the point of diminishing returns for graduate learners. *The Internet Higher Education*, 48, 100774.
- Memon, A. B., & Meyer, K. (2017). Why we need dedicated web-based collaboration platforms for inter-organizational connectivity? A research synthesis. *International Journal of Information Technology and Computer Science*, 9(11), 1-11. <https://doi.org/10.5815/ijitcs.2017.11.01>
- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet Higher Education*, 14(2), 129-135.
- Mtebe, J. S., & Raphael, C. J. A. J. o. E. T. (2018). Key factors in learners' satisfaction with the e-learning system at the University of Dar es Salaam, Tanzania. 34(4).
- Mumtaz, N., Saqulain, G., & Mumtaz, N. (2021). Online academics in Pakistan: COVID-19 and beyond. *Pakistan Journal of Medical Sciences*, 37(1), 283.
- Naveed, Q. N., Muhammed, A., Sanober, S., Qureshi, M. R. N., & Shah, A. (2017). Barriers Effecting Successful Implementation of E-Learning in Saudi Arabian Universities. *International Journal of Emerging Technologies in Learning*, 12(6). <https://doi.org/10.3991/ijet.v12i06.7003>
- Ngampornchai, A., & Adams, J. (2016). Students' acceptance and readiness for E-learning in Northeastern Thailand. *International Journal of Educational Technology in Higher Education*, 13(1), 1-13.
- Olum, R., Atulinda, L., Kigozi, E., Nassozi, D. R., Mulekwa, A., Bongomin, F., Kiguli, S. J. J. o. M. E., & Development, C. (2020). Medical education and E-learning during COVID-19 pandemic: awareness, attitudes, preferences, and barriers among undergraduate medicine and nursing students at Makerere University, Uganda. 7, 2382120520973212. <https://doi.org/10.1177/2382120520973212>
- Ouatik, F., & Ouatik, F. (2021). *Learning Management System Comparison: New Approach Using Multi-Criteria Decision Making*. Paper presented at the International Conference on Business Intelligence.
- Panda, S., & Mishra, S. (2007). E-Learning in a Mega Open University: Faculty attitude, barriers and motivators. *Educational Media International*, 44(4), 323-338. <https://doi.org/10.1080/09523980701680854>
- Paul, J., & Criado, A. R. (2020). The art of writing literature review: What do we know and what do we need to know? *International Business Review*, 29(4), 101717.
- Paul, J., Lim, W. M., O'Cass, A., Hao, A. W., & Bresciani, S. (2021). Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR). *International Journal of Consumer Studies*. <https://doi.org/10.1111/ijcs.12695>
- Pham, L., Limbu, Y. B., Bui, T. K., Nguyen, H. T., & Pham, H. T. (2019). Does e-learning service quality influence e-learning student satisfaction and loyalty? Evidence from Vietnam. *International*

- Journal of Educational Technology in Higher Education*, 16(1), 1-26.  
<http://doi.org/10.1186/s41239-019-0136-3>
- Popoola, S. O., & Olajide, O. (2021). Influence of Library Anxiety and Computer Literacy Skills on Use of Library Information Resources by Undergraduates in Private Universities in Southwest Nigeria. *International Information Library Review*, 1-19.  
<https://doi.org/10.1080/10572317.2021.1873051>
- Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers Education*, 144, 103701.  
<https://doi.org/10.1016/j.compedu.2019.103701>
- Richardson, M., Abraham, C., & Bond, R. J. P. b. (2012). Psychological correlates of university students' academic performance: a systematic review and meta-analysis. 138(2), 353.  
<http://doi.org/2012-04281-001>
- Saeed Al-Marouf, R., Alhumaid, K., & Salloum, S. (2021). The continuous intention to use e-learning, from two different perspectives. *Education Sciences*, 11(1), 6.  
<https://doi.org/10.3390/educsci11010006>
- Sahibzada, U. F., Xu, Y., Afshan, G., & Khalid, R. (2021). Knowledge-oriented leadership towards organizational performance: symmetrical and asymmetrical approach. *Business Process Management Journal*. <https://doi.org/10.1108/BPMJ-03-2021-0125>
- Sánchez-Sordo, J. M. (2019). Data mining techniques for the study of online learning from an extended approach. *Multidisciplinary Journal for Education, Social Technological Sciences*, 6(1), 1-24. <https://doi.org/10.4995/muse.2019.11482>
- Sayaf, A. M., Alamri, M. M., Alqahtani, M. A., & Al-Rahmi, W. M. (2021). Information and Communications Technology Used in Higher Education: An Empirical Study on Digital Learning as Sustainability. *Sustainability*, 13(13), 7074.  
<https://doi.org/10.3390/su13137074>
- Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education*, 33(4), 289-306. <https://doi.org/10.1080/08923647.2019.1663082>
- Tarhini, A., Hone, K., & Liu, X. (2014). Measuring the moderating effect of gender and age on e-learning acceptance in England: A structural equation modeling approach for an extended technology acceptance model. *Journal of Educational Computing Research*, 51(2), 163-184.  
<https://doi.org/10.2190/EC.51.2.b>
- Williams, R. I., Clark, L. A., Clark, W. R., & Raffo, D. M. (2020). Re-examining systematic literature review in management research: Additional benefits and execution protocols. *European Management Journal*. <https://doi.org/10.1016/j.emj.2020.09.007>
- Wu, J.-H., Tennyson, R. D., & Hsia, T.-L. (2010). A study of student satisfaction in a blended e-learning system environment. *Computers Education*, 55(1), 155-164.  
<https://doi.org/10.1016/j.compedu.2009.12.012>