Article

A SYSTEMATIC LITERATURE REVIEW ON TEACHING AND LEARNING IN DIGITAL AGE AT THE HIGHER EDUCATION LEVEL

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***Abstract:** The concept of digital world has been an emerging trend of e-teaching and learning in the COVID-19 pandemic. Digital age has now become a powerful and leading opportunity for education at tertiary level. In Pakistan, e-learning has become a prominent interest by substituting the traditional pedagogy with online models. It is the process that empowers the educators and students to learn digital skills. However, due to sudden outbreak of the pandemic, the entire world is shook and the education system has faced with a number of hurdles and challenges that need to be addressed. This systematic literature review is an attempt to create an understanding about the teaching and learning in digital age while highlighting different methodologies used in and findings of articles under the review in order to provide researchers with further avenues to conduct future research on different aspects of use of digital means in teaching, learning environment and while evaluating learning outcome of digital learning at the tertiary level of education. A meta-analysis method is use to collect data by using electronic database searches to find relevant articles ranges from year 2015-2020. A sample of 15 articles was taken from the period under study which were further classified into different themes.*

INTRODUCTION

In the modern times, the increased dependence on information and communication technologies in all sectors is critical. The sudden outbreak of COVID-19 pandemic compelled the education systems worldwide to shift to the online mode of learning irrespective of the level of education. This sudden need challenged the education systems and forced the educators and students to shift to the digital mode of teaching and learning. In the 21st century, the digital technologies have a very dominating role in all spheres of life and the education sector is not an exception. Such technologies have triggered sharp change in interaction, communication, socialization as well as the ways and processes of teaching and learning. Resultantly, educational institutions who were previously reluctant to change their traditional approach of teaching had no other option but to shift to the online mode of teaching. Nonetheless, the digital age of teaching and learning provides many opportunities to education system, learners and teachers alike to enhance their skills according to digital needs. The digital learning is recommended by many researchers at the higher education level as it encourages students to use digital technology for interaction, learning and collaboration as well as for knowledge gain and exchange so that a student may became a proficient member of a modern age society and play a constructive and active role in increasing digitalization in the world. In addition to this, the use of digital has also improved the teaching learning environment and made the process of learning effective by increasing learners' motivation level by providing them with the universal learning. In this paper, literature on

teaching and learning in digital age is reviewed with an aim to explore and report how digital modes of education have shaped the tertiary or higher level of education world-wide.

METHODOLOGY

This is a qualitative study based on a systematic literature review for analyzing the relevant studies. For systematic review, articles from the existing body of literature were gathered by means of different databases which then were classified into different themes. The data / relevant studies were obtained through open access journals available on Google Scholar, JSTOR, Springer, Science Direct and Research Gate from the years 2015-2020. Themes such as (I) teaching and learning in digital age; (II) emerging trends of e-learning; (III) needs and challenges of digital world; (IV) impact of digital technology on higher education were identified and the studies were gathered to analyze the method, results and conclusion as reported by their authors. To sort out relevant data, this study followed a three staged process as given below:

Stage 1: Selection of Databases to Search Relevant Studies
In the first stage, online databases were selected to search studies related to teaching and learning in the digital age. The search was done through using keywords including; "teaching in digital age", "learning in digital world" and "impact of digital technology on higher education" using web engines.

Stage 2 Selection of Studies Relevant to the Study
In next stage, surfing on Google, JSTOR, Springer, Science Direct and Research Gate was carried out to select relevant articles for the study. Subsequently, twenty articles were selected. Studies that were not relevant or were not between years range 2015-2020 were excluded. After the precise selection, fifteen articles with various themes were included in the review.

Stage 3 Classification of Relevant Articles
At this last stage, relevant studies were classified into different themes which include: (I) teaching and learning in digital age; (II) emerging trends of e-learning; (III) needs and challenges of digital world; (IV) impact of digital technology on higher education

LITERATURE REVIEW

S. N.	Topic of Articles	Authors	Year	Methodology	Findings
1	Emerging trends of e-learning in Pakistan: Past, Present and Future.	Siddiquie, N & Khalid, R	2017	Conceptual Paper	E-learning in the education sector act as revolution that is effective in maximizing the performance learning in Pakistan.
2	E-learning challenges faced by academics in higher education	Islam. N, Beer, M & Slack, F	2015	Qualitative Research	A gap was identified in literature that shows a group of challenges concern with higher education institutions and at the end five broad categories were fined out.
3	Higher Education in digital age: the impact of digital connective technology	Saykii, A	2019	Qualitative Research	Impact of digital technology in education system has systematic transformation from the traces of traditional approach that support the learning and development of higher education.
4	Teaching and learning in digital world. Strategies and issues in higher education.	Gisber, M & Bullen, M	2015	Qualitative Research	It has been examined that teaching and learning in digital world is the process of 3D learning environment that will help describe their point of view in both practical and theoretical concept.

5	Study of the impact of online education students learning at university level in Pakistan.	Akhter, H & Mahmood, M	2015	Descriptive	To improve online education certain efforts must be made by the authorities to improve the learning opportunities of the student.
6	Computer based technology and students engagement	Schindler, L. Burkholder, G. Morad, O & Marsh, C	2017	Critical Review	The computer based technology has the strong influence on the engagement of the student.
7	Digital technology for learning, investigate need and challenges	Noreen, S & Malik, A	2020	Mixed Method Approach	In order to increase accessibility and flexibility of learning students need digital technologies which have challenges for implementation.
8	Digital technology & practices for improvement	Lakkala, M	2018	Research-based Model	It has been indicated that innovative digital model worked shows the difference between practices of school and improvement of challenges.
9	Digital transformation in higher education	Bond, M, Marin, V, Dolch, C, Bedenlier, S & Richter, O	2018	Descriptive Statistics	In teaching and learning process the most useful tool at higher education level was learning management system in which both students and teachers use it for limited task.
10	Digital learning environment	Kummel, E, Moskaliuk, J, Cress, U & Kimmerle, J	2020	Literature Review	According to findings there are two types of learning situation according to individual and social settings for the measurement of learning outcome of digital technology at higher education are; elaboration and social interaction.
11	Engagement & performance of students at university	Delfimo, A	2019	Descriptive Correlation Method	There is a positive correlation between engagement and performance of the student as well as educators, institutes and parents must have a strong collaboration that helps the student to maximize their engagement.
12	Online learning in the time of covid-19 crisis	Dhawan, S	2020	Descriptive, Systematic Review	In the pandemic of covid-19 there is a greater need to study technology to cope up with the crisis and online learning support and facilitate teaching, learning and activities.
13	Teaching tools in digital age	Napal, M, Lacambra, A & Penalva, A	2020	Scheme for Evaluation	An instrument of educational platform explore resources and activities to select competences that will help the managers to work by focusing of their objectives to achieve competencies.
14	Trends of e-learning	Berrocoso, J, Garrido, M, Videla, C & Morales, M	2020	Systematic Literature Review	There are three main nodes that were analysis from the literature are; online students and teachers, interactive learning environment.
15	Quality of learning in digital environment	Charlier, B & Cosnefroy, L	2015	Mixed Method	A model is produced as the analysis of the study that will serve the complexity of blended and digital

				Longitudinal Research	learning environment at higher education.

Table 1: Summary of Literature Review for Teaching and Learning in Digital Age

DISCUSSION

The aim of this research article was to find relevant literature on different dimensions of teaching and learning in the digital age and to examine the gaps in the previous researches that provide for the future directions for researchers. In this study, the author has reviewed the literature on impact digital world on teaching and learning in pandemic of COVID-19 at the higher education level. This literature is divided into following themes;

Theme I: Teaching and Learning in the Digital Age
The digital age mainly provided for applications of the digital tools that educators and students use to get connected in teaching and learning process.

Theme II: Impact of Digital Technology on the Higher Education
In the 21st century, digital technology is impacting all spheres of the life. They bought a dramatic change in the behavior of people and society as well as in the education sector due to the sudden outbreak of COVID-19 pandemic. According to Saykili (2019), the digital age is the new age with emerging digital technologies, education innovation and resources such as Learning Management Systems (LMS), open online course (MOOCS) and analytical learning applications that have developed a new educational paradigm globally. The digital age enables the learner to extend their learning outside the boundaries of traditional classroom or learning environment to new platforms such as using social media, online learning apps and gain enriched learning experience. Furthermore, the researcher summarizes that the higher education institutions need to transform and adopt the changes according to recent era and shift the paradigm of traditional teaching and learning according to the global vision. It was suggested by the author that blended learning environment that is a combination of both digital, online and face-to-face learning are more effective in deeper understanding of the learner, where digital tools, application and online forums serve as the solution to face challenges by higher education. Furthermore, he concluded that in order to transform teaching and learning paradigm, consistent and sustainable policies should be developed in all dimensions that will support the traditional teaching and learning paradigm with digital technology.

Theme III: Needs and Challenges of the Digital World
In the digital world, the use of digital technology promote online learning environment that facilitates mostly the distance learner but due to the current pandemic, most of the institutions and organizations have shift their paradigm to digital context. Digital world in the education scenario means to teach and learn digitally by using technology effectively and efficiently to facilitate both, students and instructors. The world is become a global platform of learning with great help of digital tools. At the higher education level, the digital mode has become a complete system of teaching and learning that facilitates every individual in the world by providing him/her with an opportunity to access and make use of online contents, learning resources, quick assessment and feedback, printed textbooks and recorded lectures. Noreen & Malik (2019) conducted a study on digital technology for learning at the Allama Iqbal Open University, Islamabad, one of the leading universities of Pakistan, addressing the needs and challenges of the digital world with mixed method approach. The findings of the study shows that students need increase accessibility and flexibility of learning using digital technologies. They also discussed some challenges that occurred in implementing digital mode of learning at their university such as: limited digital learning resources, lack of expertise of teaching and support staff, high cost of technologies, quality assurance of learning through online mode, accessibility and adapting to the change etc. Furthermore, they recommended that instructors need to get support from the university's management and required skills to know about the digital technology and online learning materials as well as teachers should be encourage to provide online feedback to students and support their learning. Internet facility should be provided to students in education institutions. Portable devices with internet access can be provided to students for learning and annual need assessment must to be done accordingly in the institutions in order to update from time to time and meet the global needs. Islam, Beer & Slack (2015) conducted a study on e-learning challenges faced by academics in the higher education sector with a literature review on limitation and challenges of e-learning technology. The findings of the study shows five broad categories of challenges faced by the higher education sector which include: (I) learning styles; (II) pedagogical; (III) technological; (IV) technical training and (V) time management challenges. The author also discussed the attitude of instructors and students towards digital learning, outcomes of e-learning and efforts done to cope up with the challenges. According to them, teachers must have good expertise on technology and positive attitude towards e-

learning. Practical training should be provided to administrators to support effective teaching process by using technology to prepare learning resources such as videos, tutorials, recorded lectures etc. Furthermore, the authors have suggested future directions for the researchers according to the reviewed literature and identifies the gap of e-learning. The major gap discussed in their article was use of mobile learning, its impact on academics, factors affecting it and required training and environment to support m-learning. The need of digital learning in Pakistan is becoming a preference and accordingly, an immense attention is being provided by the relevant authorities including but not limited to the Higher Education Commission of Pakistan, in order to cope up with current situation but there are several factors that will pose hurdles in the way of e-learning such as; poor IT infrastructure in universities, electricity issues, lack of awareness among individuals, hurdles in curriculum development, implementation of technological policies and programs, adaptation of digital pedagogical styles and lack of experience of handling gadgets. According to Siddiquie & Khalid (2017), there are three main considerations that are directly involve in implementing e-learning which are: (I) challenges being faced by teachers with regard to communication and interaction with students; (II) management of time; (III) evaluating students facilitated by LMS.

Theme IV: Emerging Trends of e-Learning

Learning through e-learning tools is the way to learn new material supported by the use of technology and electronic media to create the learning experience of individual and enhance their learning performance and efficiency. It is a self-directed learning which depends on the appropriate use of technology, user friendly devices, convenient tools and acceptance of the human being for usage. The trend of e-learning in the global market has also innovate the plans of education policy of Pakistan to boost up the higher education all over the country. The education system is continuously updating the curricula, policies, methods etc. to keep pace with the changing need of society and to accept and accommodate for the new development. A study was done on the emerging trends of e-learning in Pakistan focusing on the development of e-learning in the education sector and also to find the obstacles for future studies. Siddiquie & Khalid (2017) in their conceptual paper discussed e-learning as a paradigm shift from traditional to digital mode both on technical and human edges. The use of technology in Pakistan is not a new concept. The information communication technology is being used in informal ways to support learning through radio and television programs with an aim to teach and encourage the general population such as housewives, famers or un-skilled workers etc. Later on, an official effort was made by AIOU to offer distance and open learning at the higher education level. Digital mode has become a system of education with access of digital content, easy assessment and quicker online feedback from tutors (Noreen & Malik, 2019). Similarly other institutions such as COMSATS University, National University of Computer and Emerging Sciences, and National University of Science & Technology also played an important role in the development of technology in the higher education sector with the increase amount of technology based education. The Government of Pakistan also made an initiative with notion of "education for all" to extend its continuous support and encouragement for students to learn and perform productively through e-learning platforms.

CONCLUSION

The review of current literature highlights that most of the research studies have reported both the internal and external challenges of e-learning at the higher education sector as faced by the higher education institutions. According to literature under study, the digital age or use of technology is not a problem at any level of education sector rather the problems are created by human factors, social context, political pressure, support system and reluctance to adapt change. In most of the studies, it has been discussed that challenges are both internal and external for which the researchers has categorize as barriers, so it has been revealed through literature review that internal barriers are; lack of facilities and equipment, deficiency of technological support, shortage of resources and unreliability of instruments. Whereas external barriers may include; organizational culture, resistance to change, teachers training and commitment, non-structured policies and strategies etc. both the internal and external barriers have a very strong influence on the implementation and practice of technology in education, with the increasing demand of digital world the education at higher level faces certain barriers that had a negative influence such as; infrastructure, financial issues, inadequate policies and strategies, insufficient technical skills both at teacher and student part, reluctance to change, inappropriate development of e-learning content due lack of time, no proper feedback, frustration and mismatch of today's digital age of education system, instrument, culture and environment with the previous instructive age. Furthermore review literature suggested that a blended mode of learning must be used that will be helpful to transform traditional teaching and learning paradigm with the combination of online and face-to-face learning. From the current literature under review, it has been concluded that new age digital learning consist of different modes such as; online, face-to-face, blended and collaborative learning that includes both ways synchronize and asynchronies where as digital teaching includes planning of e-learning content, use of appropriate approaches and techniques for learners, support learners to enhance their skills, assessment and feedback should be

focus and the educators must need to self-develop them with the increasing age of technology. The emerging trends of digital mode of teaching and learning focus by the authors in the study are; learning management system, massive open online courses, social media, online learning applications and e-libraries etc. for an effective teaching and learning process that will help every individual to learn at their ease.

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