

Identification of effective measures of an e-learning System

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Abstract- To improve education in terms of modern learning and to have successful teaching and learning environments, e-learning approaches and technology have become vital. The tremendous expansion in technological information over the last several years has led to the rise of technology-delivered teaching as an essential learning and education technique. In this context, several academic studies have examined the significance of e-learning efficacy. Existing models of e-learning efficacy have enhanced our knowledge of how online training may support and enhance learning, but the majority of published models ignore the significance of the link between interaction of e-learning platforms with students. The authors in this study learn through a closer review of the search results that past academics had utilised diverse definitions and techniques to define and study effectiveness. Learning and development specialists in both public and private enterprises are increasingly questioning the effectiveness of their learning and development programmes. This study investigates the usefulness of online learning through an integrated review.

Keywords: e-learning, students, Education, Artificial Intelligence

1. Introduction

More research has been done in recent years to assess the efficacy of e-Learning. This is primarily due to improved IT and educational capacities as well as a greater institutional and governmental attention on "what works" in education.

Learning strategies are always evolving and becoming more and more reliant on technological developments. As a consequence, communication is enhanced, information collecting is expedited, and problem-solving is made easier. The process of learning using online tools and techniques is known as e-learning. It involves the online transmission of information and skills. E-learning strategies and tools include things like interactive learning, virtual classrooms, Browser learning, desktop learning, and more. Some of the systems that can transfer material include the Internet, extranets, intranet, audio tapes, video tapes, satellite TV, compact disk, read only memory, and the cloud. The early titles for e-learning were "Internet-based training" and then "Web-based Training." These terms, along with e-variants such e-learning, E-learning, and eLearning, are still in use today [1-2].

Since they are actually available everywhere, e-learning programmes provide appealing options for educating huge numbers of geographically varied people. They enable simple distribution and updating of standardised instructional material. The time and location of learning are within the control of the learner, and systems offer automated instantaneous comments from students and instructors. Furthermore, educators are extending and enhancing current curricula with e-learning options rather than abandoning teacher-centred pedagogy, and students welcome this. However, as e-learning becomes more prevalent in education, there is a greater need to show that it is beneficial [3].

It can be challenging to gauge and define the efficacy of sophisticated treatments like e-learning. Learning is a measure of how the programme has altered one's attitudes, knowledge, or abilities. The application of learning serves as a representation of behavior [4-10]. Results are a final indicator of how learning has altered organisational procedures or patient outcomes. We conducted a scoping

study to find and assess the literature on the value of e-learning in teaching. Evaluation of efficacy in terms of learning, and the result was our initial aim. The efficacy of systems to e-learning programmes was our secondary goal [11-20].

2. Literature review

2.1 Background e-learning

The term "e-learning" was originally coined by Elliot Masie at his Teach Learn Conference in 1999, and it was then introduced and applied in a business setting (Gutierrez, 2014). The concept of e-learning is widely discussed in the vocational and technical industries, as per Arkorful and Abaidoo (2015). Many definitions focus on various aspects of the method, depending on the objectives of the researcher. For instance, according to (Twigg, 2002), interactive, self-paced, and flexible e-learning is dependent on the learner. However, Tao et al. (2006) highlighted that the focus of e-learning is now on the virtual technologies that connect students to get individualised support and design their own flexible study schedules. "According to Arkorful and Abaidoo, the idea of e-learning is often debated in the vocational and technical fields (2015). Depending on the goals of the researcher, several definitions concentrate on different components of the approach. For instance, interactive, self-paced, and adaptable e-learning rely on the student, according to (Twigg, 2002). However, Tao et al. (2006) emphasised that the focus of e-learning is on the virtual networks that enable students to get individualised support and design their own flexible learning schedules. E-learning research has grown steadily over time. The focus of the probe is narrowing. The research industry also expands each year. Even while e-learning has advanced to this point, it can still be in its early stages. Future success for e-learning is quite likely."

Evaluation of E-learning

As social science and technology, information globalisation, and educational advancements have all improved, e-learning has gained popularity throughout time. E-learning is the

process of instantly transferring information and understanding via the use of technology and the internet, as opposed to conventional learning techniques. E-learning differs from the methods of instruction employed in traditional educational institutions because of its high efficacy, usefulness, ease of access, and abundance of instructional resources. With help from the development of Internet technology, these characteristics have contributed to the gradual rise and acceptance of the e-learning system in the primary market.

Benefits of E-learning

The e-learning environment emphasises student interaction, in contrast to traditional instruction, and students and faculty today occupy quite distinct roles. In e-learning, the emphasis is on the student [21]. The delivery of teaching is flexible. Classes that use the traditional method of education frequently last 40-45 minutes. Computer systems and other multimedia technologies may be used to teach curriculum to students. Students can decide on their own how long class will last as a consequence [22].

According to its definition, e-learning is the process of learning and educating using the Internet or other digital information. Online video, multimedia programmes, musical recordings, emails, and cloud are just a few of the various ways that information may be presented for education in the e-learning context [23-32]. The abundance of educational resources that are accessible through e-learning is made possible by computers, the Internet, and multimedia devices. By utilising these instructional tools, e-learning may be able to provide a productive learning environment that will increase students' enthusiasm for learning and give them the skills necessary to rationally assimilate information [33].

Positive designs may be produced through concentrating on the student experience and larger networks that influence and contribute to that experience (Andrew r. Brown et. al., 2005). This increased reliance on technological trends makes the design process essential. As they guide learners through the complex and even contradictory needs that affect the development of an effective e-learning design, educational designers may focus on six elements: activity, scenario, feedback, delivery, context, and influence (Andrew r. Brown et. al., 2005).



Fig.1: Six components help to navigate the complexity

2.4 Identification of effective e-learning features

Depending on how the instructor delivers it, traditional classroom education may be effective or ineffective. Depending on the designers or developers experience, e-learning efficacy may range from excellent to bad (Steen, 2008). To succeed in one e-course, it is crucial to play the roles of both the teacher and the designer, i.e., those who must jointly build and protect the e-course. The effective learning on the other hand depended on the teacher's oversight, guidance, and advice throughout the process (туин & туин,

2012). Training designers need to be skilled in developing efficient e-learning to meet these goals. This is difficult because developing good eLearning requires both art and science, needing an understanding of the concepts that must be taught as well as the application of training and learning theory (Steen, 2008). A final problem is that there is no one strategy that works for all eLearning designs. Courses vary from one another. The balance of the components is achieved, nonetheless, via a generic technique. If the designer carefully follows every requirement, effective e-learning is far more likely to occur. There are several variables that affect how successful eLearning is. Effective e-learning often exhibits the characteristics listed below, claim Angeliki, Asimina, and Eleni (2005): Successfully achieving learning goals, being readily available, having a clear and accurate message, being user-friendly, engaging, memorable, and relevant, and requiring less money for training [34-40].

2.5 Gaps in literature

The following are the gaps in the literature that the literature study has identified:

1. The efficiency of e-learning systems is seldom covered in literature.
2. There are few evaluations of the efficiency of e-learning.
3. Insufficient information has been provided in the literature on the difficulties with e-learning in the Indian setting. In reality, the author was unable to locate a current article that deals with the problem of e-learning in rural India.
4. Additionally, the author was unable to locate any useful design recommendations for those creating e-learning systems.

3. Methodology

3.1 METHODS

In order to get knowledge regarding e-learning, its effectiveness, efficacy, and evaluation criteria, a scoping literature study was conducted. According to the needs, the resources at hand, and the viability of the methodologies, a scoping review was chosen for this project. The amount of study time available was another important consideration in this decision [43-50]. This scoping review's objective was to search through the most recent studies in quest of metrics to gauge e-learning efficacy. The treatments selected for this evaluation will probably display traits of the e-learning efficacy assessment technique after screening, collecting, and summarizing the data. The review proceeded through the four critical steps listed below: The first four processes involve discovering relevant research, choosing suitable studies, graphing the data, assembling, summarizing, and reporting the findings (Mai T. Pham et.al., 2014).

3.2 Study Design and Setting

This study looked at the metrics and methods used to gauge the overall efficiency of e-learning and learning. It was decided on the scope and depth of the scoping review using the mixed methods technique, which evaluates all qualitative and quantitative research [51-60]. In order to evaluate the success of e-learning and investigate the natural world, the multiple case study approach enables the analysis of interdisciplinary data. On the basis of the specified evaluation

techniques, the design additionally offers a range of tested findings. The topic of interest is the global adoption of e-learning and effectiveness evaluation techniques, with a particular emphasis on the educational system in India [61-75].

3.3 Criteria and Search Strategy

A variety of materials, including grey literature, were reviewed based on predetermined inclusion/exclusion criteria. The criteria, developed prior to the search, established the contextual and scientific importance of the findings by establishing a norm for the content of the literature and experimental purpose. For the purpose of this scoping review, a number of online databases were searched, including “Science Direct”, “Springer”, “J-store”, and “Google Scholar”. The document that was provided with it spanned 2001 through 2019. The figure below displays the number of articles found in a preliminary database search by year.

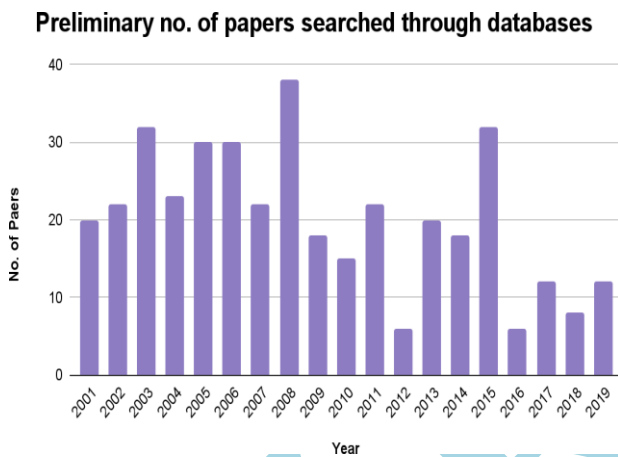


Fig. 2: Preliminary number of papers searched in the database

The search approach used the key words to locate the research article under evaluation. The following keywords were used: parameters, e-learning, efficacy, education, traditional, convention. A huge variety of sources have been further assessed to increase relevance using advanced search methods. Additionally, filters relevant to certain databases, such as comprehensive, participant, and journals, were employed where necessary.

3.4 Inclusion and Exclusion

Eligible studies comprised systematic literature review, scoping reviews, and grey literature that have been published in English between 2001-2019 in the area of education and e-learning in order to make sure the relevancy, accessibility, and calibre of the preparatory material. This established a reliable baseline for searches. This study included papers on the linked topic from all across the globe. Exclusion based on geography or population was not required for our objectives. The language age was one of the chosen exclusion factors. Due to the limited resources, research articles in only English and Hindi were accepted for consideration. None of the reviewers could comprehend any other linguistic format save these two. These research examined the advancement of education, teaching strategies, various facets of online learning, and the efficiency of online learning [76-90].

Table 1: Criteria for including and excluding research papers this study

| Criterion | Inclusion | Exclusion |
|------------------------|--|---|
| Type of article | Original research Article, grey literature | non-Cited Literature, Non-credited websites |
| Time Period | 2001-2019 | Other than 2001-2019 |
| Language | English | Non-english |
| Phenomenon of interest | Effectiveness of E-learning, Education System, Type and modes of E-learning, feature of E-learning, Learning approaches, | Other than listed in inclusion column |

3.5 Selection of Pertinent Studies

The scoping review's next step is to identify particular literature. In order to locate the range of sources that would help address the review issue, this research devised a technique to look at the English language peer-reviewed publications. This was decided to run searches across the aforementioned databases. Using the suggested documentation elements for review of the literature and meta-analysis (PRISMA) technique, the data were logged. (Moher D. et al. 2009). The search was done for publications that came out between 2001-2019. The lengthier time span of material analysed is due to the literature's primary focus on tracing the development of learning strategies and education in general. Two writers used keywords and subject headers that were unique to each database to construct and improve the text search. Search-related keywords were found in the initial stage. As shown in Table 2, the terms LMS, student happiness, and Malaysia were chosen based on previous research and the saurus searches. Now, duplicate articles were eliminated after meticulous screening.

Table 2: Search keyword in databases for publication

| Databases | Keyword used |
|----------------|---|
| Google Scholar | "E-learning" OR "Effectiveness", "Learning" OR "Effectiveness", "Education" AND "System", "Methods" AND "Literature" AND "Review", "Scoping" AND "Literature" Or "Review" |
| J-Store | "Parameters" AND "Effectiveness" AND "E-learning", "Education" AND "System", "E-learning" OR "Effectiveness", "Methods" AND "Literature" AND "Review", "Scoping" AND "Literature" Or "Review" |
| Science Direct | "Tradition" AND "Education" AND "System", "E-learning" OR "Effectiveness", "Methods" AND "Literature" AND "Review", "Scoping" AND "Literature" Or "Review" |
| Springer | "E-learning" AND "Development", "Modes" OR "Types" AND "E-learning", "Methods" AND "Literature" AND "Review", "Scoping" AND "Literature" Or "Review" |

3.6 SELECTION OF LITERATURE

After the identification was finished, literature was chosen. The chosen literature fell under the headings of effectiveness, education, and e-learning. The identified literature underwent evaluation for the selecting of literature. Finally, only publications that are closely connected to the goal of this research were chosen. The figure presents an overview of literatureselection using the PRISMA format.

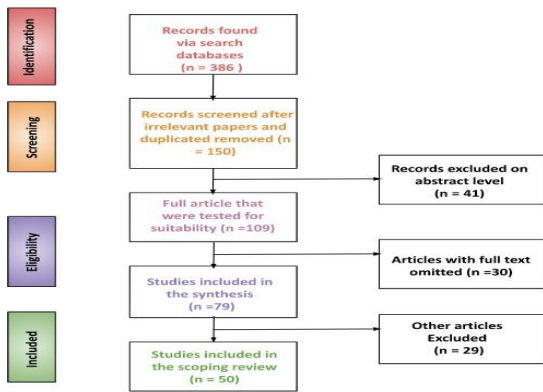


Fig. 3: A summary of the literature choice

3.7 Extraction of Data

Data extraction was performed on a finished list of studies that satisfied the requirements for inclusion. The design of the research, the length of the intervention, the types of data it gathered, the framework it used, the tools it offered for measuring efficacy, and the results of the intervention were all documented. Conclusions have been drawn using the gathered data that has been summarized.

3.8 FINDINGS

The following are the results of studies:

Table 3: Discovery of the chosen articles

| | | |
|--|--|--|
| Salter, S. M., Karia, A., Sanfilippo, F. M., & Clifford, R. M. (2014). Effectiveness of E-learning in pharmacy education. <i>American journal of pharmaceutical education</i> , 78(4). | The success of e-learning in a healthcare study context is evaluated in the research using a variety of metrics, one of which is perceived effectiveness. | The perceived efficacy of online courses is used in the paper as a measurement factor for total effectiveness. Maintaining the learner's motivation throughout the course depends on the significance of this criterion. |
| Martinez-Caro, E. (2011). Factors affecting effectiveness in e-learning: An analysis in production management courses. <i>Computer Applications in Engineering Education</i> , 19(3), 572-581. | Numerous measurements were discovered to be positively linked with course efficiency. E-learning has been proven to benefit from its flexibility and engagement, as well as from both student-teacher and student-student contact. | The study makes a case for using an interaction platform to deliver online courses more successfully and to assess how effective they are. |
| Xu, J., Lio, A., Dhaliwal, H., Andrei, S., Balakrishnan, S., Nagani, U., & Samadder, S. (2021). Psychological interventions of virtual gamification within academic intrinsic motivation: A systematic review. <i>Journal of Affective Disorders</i> , 293, 444-465. | This research study suggests that gamification is a crucial and relatively new strategy for improving a course. | Gamification components are an excellent metric to use when gauging the success of online courses. |
| Haverila, M., & Barkhi, R. (2009). The Influence of Experience, Ability and Interest on e-learning Effectiveness. <i>European Journal of Open, distance and E-learning</i> . | Numerous additional factors, including learner experience, are related to how successful online courses are. The study identified a negative correlation. | The study advocated tailoring material delivery to experienced learners. Any online course's effectiveness should also be evaluated in light of the experience level of its intended audience. |

4. Discussion and Conclusion

This review analyses current studies on e-learning systems' effectiveness. Learning improves gradually. Today's schools employ ancient teaching techniques. Germany developed the modern educational system. It was developed for workers who might easily be assigned tasks in an offline, sector-focused atmosphere. Technology improvements and online training increases learning opportunities. Despite e-accessibility, learning's its teaching techniques might be questionable. Internet services may be made to be deliberate, helpful, and enjoyable, which helps promote learning. Time is vital for learning. Technology and sources influence our new learning practises. The data shows how popular e-learning programmes are [101-115].

The quality of the teacher and the course's design determine how often students utilise e-learning technologies. The study's findings indicated that "course design", "content support", "course evaluation", and "teacher qualities" affects the e-learning usage. Designing with the user in mind is insufficient. By transitioning from user-centred to learner-focused, the designer must rethink the conceptual design to manage complicated learner goals and enhance memory recall via e-learning. Using spaced repetition, intermittent practice, and several senses may help. Through simulations, the teacher's role, team dynamics, and process of learning are highlighted. While real effective learning can only be assessed longitudinally, the current cross-sectional study uses perceived effective learning, which includes integrated learning and decision making [116-125].

The research design incorporated demographic parameters that didn't affect how students viewed schooling. If a study uses several samples ranging in age, gender, and employment experience, demographic variables may affect perceived effective learning. When the e-learning system's accompanying course is well-designed, it encourages students to utilise it, improving its adoption. Wright's study indicated that course design affects how the technology is used. The results show that course design boosts e-learning system performance. When course material, instructional objectives, course structure, and course output are supplied clearly in the course design, students find e-learning useful. This would boost the number of students using online learning platforms. According to the study, course evaluation had a favourable impact on both performance expectations and the use of e-learning technologies. According to study, Using an e-learning platform will be more popular with students if it's online exam evaluation delivers timely responses. Using self-assessment tests to measure students' knowledge levels in e-learning courses improves the learning process and increases the e-learning system's value for students, encouraging them to use and embrace it. This conclusion is consistent with previous studies showing that course evaluation affects real use.

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