

EVALUATION OF DISTANCE LEARNING SYSTEM (E-LEARNING): A SYSTEMATIC LITERATURE REVIEW

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Abstract

Research in the field of e-learning is currently experiencing rapid development, especially due to the covid 19 pandemic. The application of e-learning in the world of education is currently the main thing and requires evaluation of its use. This study aims to determine the evaluation of models and trends in the development of e-learning (Learning Management System). Applying the Kitchenham approach, this System Literature Review (SLR) uses three main databases including Science Direct, ACM, SCOPUS. The final result obtained 38 articles published between 2016 and 2021. From this SLR, it was found that there were 7 criteria, namely Platform, Evaluation Model, Evaluation, Model, Approach, Problem, Trend and Challenge. These 7 criteria can be used for further research on e-learning. Thus this research provides knowledge about criteria that can be used further in research on E-learning and provides insight into its state-of-the-art.

Keyword: e-learning, learning management system, systematic literature review

1. Introduction

With the outbreak of the current covid 19 pandemic, it has changed various aspects of human activity, one of the activities affected is the world of education, especially universities. Universities are required to be able to provide distance learning services that are capable of accommodating all the needs of students to conduct distance learning. Many universities do not have the readiness to conduct distance lectures, both in terms of human resources, technology infrastructure, learning systems (learning management systems / e-learning). The unpreparedness of educational institutions (Universities) when switching from traditional face-to-face lectures to distance education channels causes several problems [39]. Thus, it is necessary to conduct an evaluation of distance learning to determine the extent to which the acceptance of the distance learning system (learning management system / e-learning) is accepted by its users.

Several studies have been conducted regarding the evaluation of e-learning users (distance learning) to measure the success of using distance learning systems. Tautz has evaluated the application of digital tools (lecture recordings, question tools, classroom response systems and virtual reality) regarding the perceived impact on active learning, repetition, and feedback in Higher Education [40]. Some researchers measure the success of information system acceptance using the

DeLone and McLean model to measure the quality, system use, perceived benefits and student perspectives [40]. Other studies have been conducted to determine the acceptance factors of the COVID-19 pandemic online learning platform using the Extended Technology Acceptance Model (ETAM) and the Delone and McLean IS Success Model by testing several factors, namely the user interface (UI), perceived ease of use (PEU), perceived usefulness (PU), information quality (IQ), system quality (SQ), behavioral intention (BI), and actual use were analyzed by Structural Equation Modeling. (SEM) [41].

Therefore, this research is proposed with the aims to conduct a Systematic Literature Review (SLR) approach from SCOPUS, ACM and Science Direct database to identify the methods used by current research to evaluate distance learning (learning management system / e-learning), the results, as well as trends and issues that arise from the application of the evaluation method.

2. Research Method

This Systematic Literature Review (SLR) research is based on Kitchenham with the stages of planning, implementation and reporting [40]. Starting with determining the main purpose of this research, namely to know the evaluation and trend of using e-learning (Learning Management System). The next stage is to

determine the review protocol in the form of criteria, research questions, boolean search and year ranges, types and sources of literature. To determine the research question using the PICOC Formula (Population, Intervention, Comparison, Outcome, and Context). The next stage is to determine the inclusion and exclusion criteria as well as a literature quality test checklist.

Table 1. PICOC Formula

Populasi (<i>Population</i>)	e-learning or distance learning or learning system management
Intervensi (<i>Intervention</i>)	evaluation model
Perbandingan (<i>Comparison</i>)	-
Hasil (<i>Outcome</i>)	trend
Konteks (<i>Context</i>)	student or teacher

Based on the PICOC formula, the following research questions are formulated :

1. How to evaluate the use of e-learning (learning system management) to support distance learning?
2. What are the issues/trends that can emerge from the evaluation of the successful model of using e-learning in distance learning based on the relevant literature?

The Boolean search used in this study is ("e-learning" OR "distance learning" OR "learning management system" AND "evaluation model" AND trend AND student OR teacher). This research focuses on research that takes place in the period 2016 to 2021, using sources from SCOPUS, ACM, and Science Direct databases that have been processed using the Mendeley Desktop application. The next stage will select the papers obtained based on the use of boolean search by using inclusion and exclusion criteria in the title and abstract. The inclusion and exclusion criteria in this study are based on the research question and the Kitchenham guidelines [42]. The kitchenham method in the Systematic Literature Review (SLR) has been used by other researchers. Suryono, et al in a research paper entitled Peer to Peer (P2P) Lending Problems and Potential Solutions: A Systematic Literature Review. This research using kitchenham method aims to identify problems in P2P Lending and present alternative technical and non-technical solutions to the problems [1].

Articles containing the keywords e-learning or distance learning, obtained from several sources, namely: Scopus, ACM, and Science Direct. Of the 607 articles obtained based on searches using a boolean search, filtered based on inclusion and exclusion and checking for full articles, 38 articles were obtained that met the criteria, consisting of 3 articles for SCOPUS, 29 articles for ACM and 6 articles for Science Direct. The article screening process can be seen in Figure 1 below:

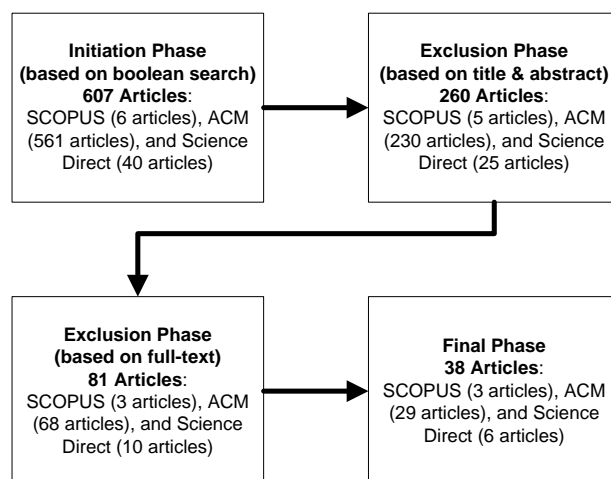


Figure 1. The selection phase of final articles

3. Result and Analysis

Based on the results of the Systematic Literature Review (SLR), an evaluation of the use of e-learning (learning system management) and trends (issues) regarding e-learning in the future can be seen in detail in table 2. In compiling the criteria of e-learning using Microsoft Excel to select and group criteria based on full paper from 38 articles.

Table 2. Criteria of E-Learning

Criteria	Detail of Criteria
1. Platform	1. MOOC [2] 2. Mobile Learning System [3] 3. Microsoft Teams [4] 4. MoodleRec [5] 5. Web 2.0 [6] 6. Mobile Learning Platform [7] 7. Mobile Teaching Platform [8] 8. Hybrid Teaching Platform [9] 9. Online Teaching Platform [10] 10. Learning Management System [11]
2. Evaluation Model	1. 5 Dimensional Evaluation Model [2] 2. Kirkpatrick Model [12] 3. System Usability Scale [13] [4] 4. Technological Acceptance Model (TAM) [4] [14] [15] 5. SWOT Analysis [16] 6. Balanced Scorecard (BSC) [17] 7. Theory of Planned Behavior (TPB) [15] 8. Expectation Confirmation Model (ECM) [15]

Criteria	Detail of Criteria	Criteria	Detail of Criteria
	9. Flow Theory [15] 10. E-Learning System Success Model [11]		8. Emergency Remote Learning (ERL) [32]
3. Evaluation	1. Service Quality [12] 2. Learning Attitude [2] [18] 3. Learning Process [2] 4. Learning Effect [2] 5. Learning Engagement [19] 6. User Satisfaction [13] [20] 7. Usability [13] [4] [21] 8. Utility of E-learning [20] 9. Gender [20] 10. Technology Adoption [14] 11. Teaching Quality [22] 12. Learning Performance [23] 13. Technology Use [6] 14. Learning Enthusiasm [7] 15. Interest of Learning [7] 16. Student and Educator Attitude [24] 17. Cognitive Ability Development [24] 18. Educational Environment [25] 19. Intellectual Activity [25] 20. E-learning Personification [26] 21. E-Learning Experiences [27] 22. Student Concentration Level [28] 23. Effectiveness of Online Teaching [29] 24. E-learning effectiveness [16] 25. Organization, Pedagogical, Technology [17] 26. Perceived Satisfaction [11] 27. Perceived Usefulness [11] 28. Student Perception [30] 29. Student Readiness [30] 30. Academic Performance [25]	5. Approach	1. Microteaching Method [7] 2. Flipped Classroom [23] 3. Virtual Classroom [33] 4. Electroencephalography (EEG) [28] 5. Heart Rate Variability (HRV) [28]
		6. Problem	1. Online Teaching is not Balanced [34] 2. Lack of Rational Introspection [34] 3. Weakened Value of Educational Subject [34] 4. Social Isolation [21] 5. Teaching Environment [35] 6. Classroom Teaching [35] 7. Student Needs [35] 8. Readiness Use Digital Tools [36] 9. Lacking Capabilities [31] 10. Negative Performance [31] 11. Lack of Experience [37]
		7. Trend and Challenge	Usage of Social Web [38] Semantic Web [38] Intelligent Technology [38]
4. Model	1. Convolutional Neural Network [19] 2. BP Neural Network [22] 3. Internet + [9] 4. Self Directed Learning [27] 5. Emergency Remote Education [21] 6. Emergency Remote Teaching [18] 7. Personal Zed E-learning Model [31]		

From the criteria that have been analyzed on the results of the SLR, it can be divided into 7 criteria, namely Platform, Evaluation Model, Evaluation, Model, Approach, Problem, and Trend and Challenge of e-learning (learning management system). Based on these criteria can be detailed into more detail.

Platforms commonly used in e-learning implementation based on 38 articles, there are 10 platforms namely MOOC, Mobile Learning System, Microsoft Teams, MoodleRec, Web 2.0, Mobile Learning Platform, Mobile Teaching Platform, Hybrid Teaching Platform, Online Teaching Platform, and Learning Management System. Platform criteria are used to provide information about platforms that are often used in e-learning, so that they can be used as research preferences for the next.

In evaluating the use of e-learning models can use many models. There are 10 Evaluation Model criteria used to evaluate e-learning, namely 5 Dimensional Evaluation Model, Kirkpatrick Model, System Usability Scale, Technological Acceptance Model (TAM), SWOT Analysis, Balanced Scorecard (BSC), Theory of Planned Behavior (TPB), Expectation Confirmation Model (ECM), Flow Theory and E-learning System Success

Model. These evaluation models can be used as a reference for research on the use of e-learning.

Other criteria used as a reference in evaluating e-learning are 30 criteria: Service Quality, Learning Attitude, Learning Process, Learning Effect, Learning Engagement, User Satisfaction, Usability, Utility of E-learning, Gender, Technology Adoption, Teaching Quality, Learning Performance, Technology Use, Learning Enthusiasm, Interest of Learning, Student and Educator Attitude, Cognitive Ability Development, Educational Environment, Intellectual Activity, E-learning Personification, E-learning Experiences, Student Concentration Level, Effectiveness of Online Teaching, E-learning effectiveness, Organization, Pedagogical, and Technology, Perceived Satisfaction, Perceived Usefulness, Student Perception, Student Readiness. The criteria for evaluating e-learning can be used to build a new model for evaluating the use of e-learning, it does not have to use all evaluation criteria but can be combined according to the needs to be researched..

In addition, there are 7 models used in modeling e-learning, namely: Convolutional Neural Network, BP Neural Network, Internet +, Self Directed Learning, Emergency Remote Education, Emergency Remote Teaching, Personal Zed E-learning Model, and Emergency Remote Learning (ERL). The e-learning models that are currently being used can be used as a reference in implementing e-learning at various levels of education.

There are 5 approaches in implementing e-learning, namely Microteaching Method, Flipped Classroom, Virtual Classroom, Electroencephalography (EEG) and Heart Rate Variability (HRV). Approach criteria are used to find out what methods have been used in several studies in e-learning.

In the implementation of e-learning, there will be many problems, based on studies from 38 articles, there are 11 problems from the implementation of e-learning, namely Online Teaching is not Balanced, Lack of Rational Introspection, Weakened Value of Educational Subject, Social Isolation, Teaching Environment, Classroom Teaching, Student Needs, Readiness Use Digital Tools, Lacking Capabilities, Negative Performance, Lack of Experience. The criteria for this problem can indicate problems that are often faced in the implementation of e-learning.

The last criteria discusses the trends and challenges in implementing e-learning, there are 3 trend and challenge criteria, namely: Usage of Social Web, Semantic Web, and Intelligent Technology. This criteria can be used as inspiration in conducting research on e-learning implementation.

The 7 criteria that have been described in detail can provide an overview of continued research on e-learning regarding the development of a new framework for the implementation of e-learning. In addition, these criteria can be used as reference material in evaluation discussions, evaluation models, platforms and approaches that can be used in research on e-learning applied at various levels of education.

4. Discussion

First, in the application of e-learning, it is necessary to review which evaluation method is the most appropriate for use at each level of education. Second, platforms that are suitable for use in the application of e-learning need to be studied further based on compatibility based on certain subjects. Third, the 30 evaluation criteria that can be used to evaluate the use of e-learning can be used to model new forms of e-learning that are more suitable. Fourth, there are many problems that arise from the use of e-learning that must be avoided from the use of e-learning. Fifth, there are trends and challenges that can be tried for the implementation of e-learning in the future.

5. Conclusion

This study uses data based on 3 sources, namely Scopus, ACM and the Science Direct database, which produces 38 articles that have conformity based on research questions that are adapted to the boolean search used. Based on the summary, it was found 7 criteria in the implementation of e-learning, namely platforms, evaluation models, evaluations, models, approaches, problems, trends and challenges. Based on these 7 criteria, it can be used to build an e-learning model that is suitable for application at various levels of education. For further research, data from other research databases can be used apart from the 3 databases (Scopus, ACM and Science Direct) that have been used in this Systematic Literature Review (SLR)

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