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Literature review: The role of learning management system (LMS) in improving the digital literacy of educators

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ABSTRACT

This literature review is conducted based on an empirical phenomenon that describes the use of technology in the education sector due to the demands of increasingly advanced developments. It aims to explain the role of using a learning management system (LMS) in increasing the digital literacy level of educators who use LMS to support the learning process. It adopted the PRISMA analysis technique. The results of the literature review show that efforts to increase educators' digital literacy may come from their own will (internal) or others' encouragement or help (external). In addition, the learning management system in the learning process may also be one way to increase educators' digital literacy through the intense interaction between educators and using the learning management system.

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INTRODUCTION

The development of technology, information, and communication today brings various conveniences to the technology users. Fulfilling people's information and communication needs can be done anywhere, anytime, quickly, and in real time. Afandi et al., (2016) describe this change as "the world is flat", referring to a situation where, due to technological advances, the world is no longer limited by national borders and time zones.

The education sector has formidable challenges and opportunities in using technology for learning (Khotimah et al., 2020). The old education system only focused on teachers, books, and memorization methods, which were too monotonous, causing learning to be boring for students. The current learning using technology may complete the learning process and help adapt to students' different learning abilities, thus improving learning outcomes (Ambarwati et al., 2022). Technology, communication, and information use in education have enormous impacts. There are tendencies in learning, including (1) a shift in the learning system from teacher-centered to student-centered; (2) the popularity growth and development of open and distance learning; and (3) the broader range of learning resources available (Hermawanto et al., 2013).

One form of using technology in education is seen through online learning. The online learning implementation in Indonesia is set out under the National Education System Law No. 20 of 2003

CHAPTER VI Article 31(2) on Paths, Levels and Types of Education, stating that the purpose of distance learning is to provide educational services to groups who cannot attend face-to-face or regular training (Undang-Undang Republik Indonesia Nomor 20 Tahun 2003, 2003). Accordingly, it can be concluded that the government supports online learning in education as long as education quality remains priorities.

Online learning shows several characteristics, such as (a) interactivity, (b) independence, (c) accessibility, and (d) enrichment (Herayanti et al., 2017). Moreover, online learning also has other characteristics such as (a) content that is relevant to the learning objectives, (b) the use of teaching methods such as presenting examples and exercises to improve learning, (c) the use of media elements such as text and graphics to convey learning material, (d) possible direct teacher-centered learning (synchronous learning) or independent learning (asynchronous learning), (e) increase of understanding and skills related to learning objectives both at individual and group learning improvement level (Clark & Mayer, 2016).

Online learning in the education sector may now be built and developed on various Learning Management System (LMS) platforms that are accessible on the Internet. Essential features of an LMS include assignments, discussions, quizzes, and rooms for uploading learning materials that teachers may use to support the learning process (Herayanti et al., 2017). Similarly, the research by Simanullang & Rajagukguk (2020) explained that the Moodle-based learning platform supports multiple learning activities, namely (1) videos, (2) discussion forums, (3) chats, (4) ways to upload materials and (5) quizzes. Educators are expected to be able to create an innovative, effective, efficient, and flexible learning environment by using LMS.

As human resources in education, educators play a critical role in supporting educational goal attainment. No matter how complex and perfect, the use of facilities, technology, and media does not guarantee the attainment of educational goals if not balanced with the abilities of the educators and educational staff supporting them. Educators must master learning technology, especially information technology, and be able to develop it further in daily learning (Permatasari, 2014). Muniroh & Muhyadi (2017) emphasize that the quality and extent of learning outcomes are mainly determined by the teacher's competence, sensitivity, and motivation. The previous explanations illustrate that educators' quality is a critical and essential factor in attaining educational goals.

Non-technical factors (equitable mastery of technology, lack of online learning experience, high internet costs, the perception that technology is not suitable for children, and so on.) that teachers and students have when using online learning systems are inseparable from the digital literacy that teachers have (Putro et al., 2020). Digital literacy can be interpreted as an individual's ability to use digital technology that includes access, selection, understanding, analysis, verification, evaluation, distribution, production, participation, and collaboration of new information and knowledge (Raharjo & Winarko, 2021). Research shows that the average digital literacy level of teachers who were the target of the research is in the excellent category; however, several indicators demonstrate that they require increasing digital literacy knowledge so that teachers may optimize the learning process more easily by using digital technology (Nada & Indrawan, 2023). Besides that, teachers' ICT skills in Indonesia are also not distributed evenly due to gaps in infrastructure and quality of education in various regions of Indonesia (Rahman et al., 2020).

Many relevant studies have examined learning management systems (LMS) in the learning process at both the school and, education and training levels. However, most of them focus on efforts to optimize student learning outcomes. For example, the research conducted by Rakhmawati et al., (2022) developed a learning management system to support the early childhood learning process during the COVID-19 pandemic era. Next are the development of a smartphone-based LMS for mathematics learning in high school (Putra et al., 2020), the development of an LMS to help manage learning in an integrated manner in one system at a university (Sam & Idrus, 2021), and the development of an LMS to help organize education and training as well as assessing employee competency in a company (Putri, 2018). Many of these focus on the learning process for students, although LMS users are not only students but also educators who play an essential role as learning facilitators. This study aims to describe the role of using a learning management system (LMS) in increasing the digital literacy of educators who use LMS to support the learning process. The contribution of this research certainly produces references that compare several articles to find research results related to educational digital literacy with the help of the use of a learning management system.

METHOD

This research is a literature review adopting the PRISMA analysis technique. The literature review uses the database from the "google scholar" site. The keywords used in the search process were "development of learning management systems" and "influence of educators' digital literacy", which were limited only to journal articles indexed as SINTA 1, 2, 3. The articles were also limited to those of the last 6 (six) years, between 2017 and 2022. These limitations are a way to focus article publication and increase the accuracy of information searches (Akbar & Biyanto, 2022). The present study was conducted in August and December 2022. Before its use, each article was evaluated based on the criteria in Table 1, as follows:

Table 1. Criteria for Inclusion and Exclusion

No.	Criteria for Inclusion and Exclusion	Criteria for Exclusion
1	Research Articles Related to Using Learning Management Systems and Digital Literacy in Education.	Research Articles Unrelated to Using Learning Management Systems and Digital Literacy in Education.
2	SINTA 1, 2, 3 - Indexed Articles Research Carried out in Indonesia Articles Published Between 2017-2022.	Not any SINTA 1, 2, 3 - Indexed Articles Research not Carried out in Indonesia Articles not Published Between 2017-2022.

After being evaluated based on the abovementioned criteria, the data and information obtained from the selected articles were combined to get new data and concepts or a deeper understanding of the role of learning management systems in educators' digital literacy.

RESULTS AND DISCUSSION

Results

The selection results found 9 (nine) articles written in the last 6 (six) years that met the criteria as these discussed the use of learning management systems and digital literacy in the education sector. The selected articles were then read and analyzed. Afterward, the articles used as data for this study are presented in Table 2 below.

Table 2. Data Source Articles for Literature Review

No.	Author(s) & Publication Year	Titles of Articles	Article Category	Topics of Articles
1	Garad et al., (2021)	The Role of E-Learning Infrastructure and Cognitive Competence in Distance Learning Effectiveness During The COVID-19 Pandemic.	SINTA 1	E-Learning Infrastructure, Individual Knowledge, and Competencies
2	Herayanti et al., (2017)	Pengembangan Media Pembelajaran Berbasis Moodle Pada Matakuliah Fisika Dasar. (Development of Moodle-Based Learning Media in Basic Physics Courses)	SINTA 1	Moodle-Based Learning Management System Development
3	Wahjusaputri & Nastiti, (2022)	Digital Literacy Competency Indicators for Indonesian High Vocational Education Needs	SINTA 1	Competency Factors and Indicators For Improving Digital Literacy 4 Competencies
4	Listiaji & Subhan, (2021)	Pengaruh Pembelajaran Literasi Digital pada Kompetensi Teknologi Informasi dan Komunikasi Calon	SINTA 2	Analysis of the Role of Digital Literacy in the Information Technology and

No.	Author(s) & Publication Year	Titles of Articles	Article Category	Topics of Articles
		Guru. (The Impact of Digital Literacy Learning on Prospective Teachers' Information Technology and Communication Competencies)		Communication Competencies among Students as Prospective Teachers
5	Novitasari & Fauziddin, (2022)	Analisis Literasi Digital Tenaga Pendidik pada Pendidikan Anak Usia Dini. (The Analysis of Early Childhood Education Educators' Digital Literacy)	SINTA 2	Digital Literacy of Early Childhood Education (PAUD) Educators Through Four Indicators: Accessing, Selecting, Understanding, and Distributing Information
6	Septyanto et al., (2020)	Pengembangan E-Learning Berbasis Website menggunakan Metode Waterfall. (The Development of Website-based E-Learning Using Waterfall Method)	SINTA 2	Development of a Website-Based E-Learning System
7	Setyaningsih et al., (2019)	Model Penguatan Literasi Digital melalui Pemanfaatan E-Learning. (Digital Literacy Reinforcement Model through E-Learning Use)	SINTA 2	Digital Literacy Reinforcement Model Using E-Learning
8	Nahdi & Jatisunda, (2020)	Analisis Literasi Digital Calon Guru SD dalam Pembelajaran Berbasis Virtual Classroom di Masa Pandemi COVID-19. (The Analysis of Virtual Classroom-based Prospective Primary School Teachers' Digital Literacy During COVID-19 Pandemic Era)	SINTA 3	Analysis of Students as Prospective Primary School Teachers' Digital Literacy in Virtual Classroom Learning due to the COVID-19 Pandemic
9	Tobing et al., (2021)	Strategi Pengelolaan Pembelajaran Berbasis Teknologi (Multiplatform) di Masa Pandemi COVID-19. (The Strategies for Technology-Based Learning [Multi-Platform) Management During The COVID-19 Pandemic Era)	SINTA 3	Technology-Based Learning Management (Multi-Platform)

Discussion

Implementing a learning management system in the education sector has become necessary at various levels of education, from primary school to higher education (Garad et al., 2021). However, there are often obstacles that may hinder the implementation process. One of the efforts to overcome the limitations existing in the implementation process of the learning management system is the need for support from the government in the form of funds to procure teleconference applications and to organize training and workshops. This suggestion is based on the research results showing that the readiness level of higher education to adopt online learning is determined by the learning experience of each human resource (Garad et al., 2021). Several points mentioned above indicate that there is a need to implement a learning management system in the education sector, as demonstrated by educational institutions. However, the lack of knowledge and skills hindered the implementation process.

Besides being a necessity in the digital era, another reason for implementing a learning management system became important in the learning process is because its features can be developed according to user needs. It is highly possible to develop web-based e-learning to support the learning process. To preserve the use of e-learning websites, it is necessary to maintain them routinely, develop their functions according to user needs, and strengthen their security (Septyanto et al., 2020). The need for the use of technology in the education sector is also increasing due to the spread of the COVID-19 pandemic in the past years. Several matters must be addressed to adapt the learning process to the COVID-19 pandemic, including technology-based or cross-platform learning management. With the support of multiple platforms, hopefully, learning will become easier and more effective for both teaching staff as teachers and students as the teaching and learning subjects (Tobing et al., 2021).

Considering the rapid use of technology in the education sector, in addition to building quality online learning infrastructure, it is also necessary to improve information and media literacy skills not only for students but also for teachers as facilitators and support from teaching staff (Garad et al., 2021). Therefore, teachers' skills and abilities in dealing with technology must align with the existing needs. Novitasari & Fauziddin (2022) study analyzing the digital literacy of Early Childhood Education (PAUD) educators shows that the average digital literacy of educators at the PAUD level is in the fairly good category; however, digital literacy knowledge to use digital devices needs to be improved so that it can help the learning process and development of early childhood. Apart from that, Nahdi & Jatisunda (2020), in their research conducted on prospective primary education teachers, found that half of the research respondents encountered difficulty using the internet for various activities, including helping with the learning process.

To improve digital literacy, educators must be able to measure the extent of their digital literacy level. There are four competency factors and 28 indicators to improve digital literacy competency. Educators can use these indicators to measure the extent of their digital literacy level (Wahjusaputri & Nastiti, 2022). After knowing the extent of their digital literacy, educators can hopefully determine their future self-development steps to improve it. The indicators are described in Table 3. Other factors, such as curiosity and self-determination, also positively and significantly influence digital literacy (Rini et al., 2022). It can be noted from the results of this study that improving educators' digital literacy may come from their own will (internal) or others' encouragement or help (external) (Wahjusaputri & Nastiti, 2022).

Table 3. Competence Factors and Digital Literacy Indicators

No.	Indicator	Sub Indicator
1	Operation Skills	Browsing and Searching
		Evaluating Data
		Managing Data
		Filtering Data and Information
		Ability to use technology
		Solving Technical Problems
		Programming
		Upload and Download Files/Apps to the Internet
		Able to Store Information and Content Data in Digital Media
		Able to Backup or Store Data in Several Places
2	Thinking Skills	General Knowledge and Functional Skills
		Information Processing and Management
		Critical Thinking in Processing Information
		Interpreting Information and Digital Content
		Developing Digital Content
		Creativity
		Analysis of Data and Information
3	Collaboration Skills	Teamwork
		Interacting through Digital Technology
		Sharing through Digital Technology
		Ability to Communicate
4	Awareness Skills	Ethics in Technology
		Understanding Hoaxes
		Balance Attitude Toward Technology
		Understanding and Awareness of ICT Roles

No.	Indicator	Sub Indicator
		Legal Literacy
		Understanding Personal Security
		Understand Device Security

Using a learning management system in the learning process may also be a way to improve educators' digital literacy. Lecturers and students may automatically gain better teaching and learning experiences using information technology due to using a Moodle-based LMS in the learning process (Herayanti et al., 2017). Another study by (Setyaningsih et al., 2019) found a model for strengthening digital competence through online learning, which includes the elements of communication and collaboration in the form of active participation in learning and research activities. Furthermore, the influence of digital literacy on the prospective educators' ICT competencies also plays a role in teaching information literacy about ICT integration policies in the learning process (Listiaji & Subhan, 2021).

CONCLUSION

A learning management system (LMS) can be used to help increase the educators' digital literacy level through intense interaction between educators and the learning management system. Using LMS in the learning process will increase educators' digital literacy levels. As interaction occurs between the educators and the LMS, the educators will be required to use technology frequently from accessing, selecting, analyzing, verifying, evaluating, distributing, and producing to collaborating on new information and knowledge to be conveyed to students.

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