

# The Impact of Learning Management System (LMS) Usage on Students

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**Abstract** – The swift advancement of technology has stimulated a metamorphosis in the realm of education, particularly in the domain of learning. Previously limited to face-to-face interactions, learning is now conducted online via a variety of devices and platforms. One of the popular platforms currently being widely used by online learning in schools and universities is the Learning Management System (LMS). The LMS serves as a comprehensive platform that facilitates educational engagement between educators and learners in the context of remote instruction. The objective of this investigation was to examine the effects of utilizing a Learning Management System (LMS) on students. This study uses a literature review method. The findings indicate that, overall, the utilization of Learning Management Systems (LMS) had a beneficial effect on academic performance among students and fostered a favorable perception of LMS implementation in educational endeavors. It is anticipated that educators will take into account the findings of this investigation when utilizing LMS to facilitate the educational process.

**Keywords** – impact, learning management system, usage, student.

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## 1. Introduction

Technological developments in the world have caused many changes in various fields of people's lives [1], [2], one of which is education. The rapid advancement of technology has made a remarkable impact on the field of education [3]. Technology in education makes a positive contribution to the lives of teachers and students in different forms [2]. The integration of technology in education represents a significant advancement towards the democratization and expansion of knowledge acquisition because teachers and students can access knowledge as a whole due to the large availability of information and various types of interactions that can be built between students, teachers, and with learning materials [4].

The incorporation of technology into educational practices across different tiers of academia via the execution of virtual learning experiences has been implemented in numerous nations [5] and is progressively gaining traction as a substitute for conventional pedagogical approaches [6]. The utilization of technological gadgets and the internet facilitates the emergence of educational advancements that offer greater temporal and spatial flexibility, as well as enhanced accessibility to learning resources [7], [8], namely online learning, either fully or mixed. Online learning is carried out by delivering learning materials and skills through technology, both in the form of web and sophisticated applications that transcend regional and time boundaries and are inexpensive [9], [10], [11]. The structure of online learning is designed to utilize electronic or computer-based systems to facilitate and enhance the learning process through virtual communication [12]. The utilization of diverse online learning tools has had a favorable impact on students, facilitating the development of their cognitive abilities and competencies [13], [14].

The transition from traditional, face-to-face learning to online learning is a necessary shift [15].

This requires a platform that can accommodate all the needs of both teachers and students to interact; the platform is LMS [9], [11], [16], [17]. The LMS serves as a pedagogical instrument within a digital setting that involves web technology in the process of analysis, regulation, and dissemination of knowledge, values, skills, and assessments and can be a place for sharing for teachers and students in obtaining material, educating administration and informing in an integrated environment [9], [18], [19], [20]. Learning management systems (LMS) play a crucial role in facilitating distance learning [21], [22] by offering a range of functions, including the presentation of learning materials, sharing and discussion of presented materials, course management, completion of coursework, attendance of exams, provision of feedback on homework and exams, organization of learning materials, and maintenance of records pertaining to students, teachers, and systems. The Learning Management System (LMS) leverages the full range of internet-based opportunities to facilitate a collaborative learning environment for students and educators situated in disparate locations. This is achieved through synchronous or asynchronous modes of engagement [23].

LMS as a forum that facilitates online interaction in an educational institution, has its pluses and minuses; the advantages of using LMS in learning are saving education costs and changing student access which is more structured but does not change the competitiveness between students [11], teachers and students can interact outside the classroom regardless of the position of their students in any part of the world and unlimited time so that the flow of information that students get is also faster and cheaper [18]. Then according to that learning using LMS, teachers, and students have their way of building interactions with each other, collaborative responses, and collaboration [24]. LMS also allows teachers and students to form fun new ways of communication through the use of learning media that are always updated according to the times, which are proven to increase motivation and learning achievement [25]. Then the LMS makes students and teachers flexible to investigate, explore, and receive information related to assignments and learning activities at certain times with the same rights and speed for each student. Meanwhile, the drawbacks of LMS are the limitations of everyone in adopting technology, the initial cost of procuring equipment is slightly more expensive, the delivery of values and norms is inefficient, it cannot be maximized in the process of monitoring student activities during learning, instructional design of learning in the LMS may not match the needs of teachers and students [20].

Various studies related to using LMS with literature review [26], [27], [28] have been carried out by several researchers. Altinpulluk & Kesim [26], found and described tendencies in the use of LMS. Turnbull et al [28], conducted a comparative analysis of research methodologies, research approaches, and data collection methods employed in contemporary study options in Australia and China. The study drew on various articles related to the use of LMS to identify similarities and differences in these research practices. Kraveva et al [27], conducted an analysis of multiple research articles pertaining to the utilization of Learning Management Systems (LMS). The authors provided a detailed account of the usability and software functionality of LMS frameworks. However, these various literature reviews have not explored the impact of using LMS on students. As a powerful platform that is popular and is starting to be widely used in online learning both in schools and universities, the impact of LMS on students needs to be known and investigated so that it can be taken into consideration by teachers when choosing and using LMS to support the learning process. The objective of this investigation was to examine the effects of utilizing a Learning Management System (LMS) on students. To be able to achieve the research objectives, the researchers formulated three research questions, namely:

1. What LMS did the researchers use?
2. What is the method used to determine the impact of using LMS?
3. What is the impact of using LMS on students?

## 2. Methods

This research is a narrative literature review. The research was conducted in four stages: 1) conduct a search, 2) identify keywords, 3) review abstracts and articles, and 4) review document results [29]. In the conduct search stage, researchers searched for relevant literature from reputable and popular sources, namely Science Direct, Springer Link, Sage Journals, Taylor and Francis Online, and Eric. At the stage of keywords identification, researchers enter keywords in the title column, such as “Learning Management System”, “LMS”, “Impact AND Learning Management System”, and “Effect AND Learning Management System”. In the search, the researcher also uses several criteria; namely, the article is a journal article and contains empirical research, and was published in the 2015-2021 range. Then the researcher selects articles whose titles have relevance to the research problem and are in accordance with the established criteria.

In the abstracts and articles review stage, the researcher first checks the relevance of the abstract to the research problem according to the criteria and then reviews articles whose abstracts have been assessed as relevant to the research problem and according to the criteria. At the document result stage, the researcher summarizes and synthesizes the findings from the article and then integrates them into the writing. Of the 23 selected articles, 14 were indexed by Scopus, 4 were indexed by Web of Science, and Google Scholar indexed 5. The journals that published the selected articles are presented in Table 1.

Table 1. Journals Publishing Selected Articles

No	Journal	Frequency
1	Africa Education Review	1
2	African Journal of Health Professions Education	1
3	Asia Pacific Management Review	1
4	Asian Journal of Research in Education and Social Sciences	1
5	Australian Journal of Teacher Education	1
6	Behaviour & Information Technology	1
7	Computers Informatics Nursing	1
8	Computers & Education	1
9	Education and Information Technologies	1
10	E-Learning and Digital Media	1
11	Heliyon	1
12	Interactive Learning Environments	1
13	International Journal of Education and Development using Information and Communication Technology	1
14	International Journal of Geography and Environmental Management	1
15	International Journal of Learning, Teaching and Educational Research	1
16	International Journal of Technology and Human Interaction	1
17	Journal of Digital Learning and Education	1
18	Journal of Software Engineering and Applications	1
19	Jurnal Pendidikan IPA Indonesia/ Indonesian Journal of Science Education	2
20	On the Horizon	1
21	Research in Learning Technology	1
22	Turkish Online Journal of Distance Education	1

### 3. Findings and Discussion

The findings of this study can be divided into three categories, namely LMS Used by Researchers, Method Used to Examine LMS Usage Impact on Students, and The Impact of LMS Usage on Students. They are discussed in detail below.

#### 3.1. LMS Used by Researchers

Researchers use various LMS to support online learning. Based on the source, the LMS used can be classified into two, namely LMS developed specifically by researchers or institutions [3], [20], [30] and LMS that are freely available or commercial, such as Blackboard [4], [16], [31], Moodle [32], [33], Edusoft [16], [34], Canvas [35] and Blendspace [17]. In addition, based on access, the LMS can be classified into two, web-based and application-based [23].

Rizal et al [3], developed an LMS named LMS3 (Learning Management System Supported Smartphone). This LMS can be accessed using a PC or laptop and a smartphone. In addition, this LMS also supports synchronous learning. Then Saputro et al [30], developed an LMS named BERSAQRAL. The LMS is founded upon scientific principles, the teachings of the Qur'an, and observations of the natural world. It utilizes open-source materials and employs an adaptive approach through Problem-Based Learning. Additionally, the LMS is equipped with features such as plagiarism checkers, download facilities, and rating menus. Furthermore, Thepwongsa et al [20] and their colleagues at the faculty developed an LMS named KKUMEDX. This LMS allows users to adjust the function and appearance more flexibly.

#### 3.2. Method Used to Examine LMS Usage Impact on Students

Method Used to Examine LMS Usage Impact on Students can be divided into two categories, namely Method Used to Examine LMS Usage Impact on Students' Achievement and Method Used to Examine LMS Usage Impact on Students' View. Both are discussed in detail below.

##### 3.2.1. Method Used to Examine LMS Usage Impact on Students' Achievement

The method used by researchers to examine the effect of using LMS on learning achievement is the quantitative method and the mixed method. However, most researchers use quantitative methods. The quantitative research designs used by researchers can be classified into two, namely non-experimental design [20], [36], [37], [38] and experimental design [15], [23], [30], [32], [33], [34]. In a non-experimental design, the researchers investigated the correlation between the variables. The researcher used questionnaires and documents related to learning and outcomes in this research design to collect data.

Meanwhile, in the experimental design, the researchers tested the difference between two or more samples after treatment. In this research design, the researchers used tests to collect data.

Akay & Gumusoglu [36], investigated the relationship between students' achievement and Proficiency Exam results in the English Preparatory Program using the LMS. Student scores on LMS and English Proficiency Exam were analyzed using a logistic regression model. Al-Assaf et al [37], conducted a study to examine the effects of LMS on students. Specifically, the researchers evaluated students' acceptance of the system using the Technology Acceptance Model (TAM). The Technology Acceptance Model (TAM) assesses two primary factors: perceived usefulness and perceived ease of use. The data gathered is derived from both academic records and student information stored on the LMS. The study examined the distinction between perceived usefulness and perceived ease of use among students utilizing the LMS (Moodle). The acquired data were subjected to ANOVA analysis. Emmamoge et al [38], conducted a study to examine the effects of LMS on students, utilizing a questionnaire as a research instrument. Moreover, the data acquired from the survey was subjected to analysis through the utilization of descriptive statistics. Thepwoonga et al [20], conducted a non-experimental design study to examine the impact of LMS on students. The study utilized a questionnaire to assess the efficacy of online learning and attitudes towards LMS usage. The examined factors encompassed in the study are individual learners, perceived satisfaction, technology infrastructure, perceived usefulness, perceived ease of use, context, pedagogy, and interactivity within the LMS. The collected data is subsequently subjected to analysis through the use of descriptive statistics and binary logistic regression.

Oguguo et al [32], conducted a study to compare the learning outcomes of students enrolled in the Educational Measurement and Evaluation course who were exposed to different treatments. Specifically, the study compared the performance of students utilizing the LMS Moodle with those utilizing Computer Assisted Instruction. The process of data collection was executed through the utilization of assessments. Moreover, the data pertaining to both groups was subjected to Analysis of Covariance (ANCOVA). Ojeda-Castro [34], conducted a study to examine the impact of LMS on the acquisition of mathematical skills in higher education settings. The study compares the learning outcomes of two groups of students, one using a LMS as an experimental group, and the other not using the LMS as a control group.

The comparison is made based on the test results after the experimental group has undergone treatment. The t-test was utilized to analyze the learning outcomes data acquired from both groups. Saputro et al [30], conducted a study to investigate the impact of the LMS known as BERSAQURAL on the science interpretation skills of students. They conducted a comparative analysis of the pretest and posttest scores of students after following the intervention. The acquired data underwent analysis utilizing the Wilcoxon test due to non-normal distribution.

### **3.2.2. Method Used to Examine LMS Usage Impact on Students' View**

The utilization of Learning Management Systems (LMS) in the context of education elicits various perspectives regarding students. This perspective can be evaluated through the lenses of perception [9], [19], [35] and satisfaction [3], [16]. The methods used by researchers to explore students' views on the use of LMS are quantitative, qualitative methods, and mixed methods. The research design applied by researchers using quantitative methods is a survey. In this study design, the researchers collected data through questionnaires [3], [4], [9], [16], [19], interviews [35], questionnaires and interviews [31], [36], as well as interviews and observations [17].

Ganeser & Robert [19], explored student perceptions of using LMS (OpenLearning) using a questionnaire. The questionnaire was created using Google Forms and distributed to participants via email. The questions contained in the questionnaire relate to the role of LMS in various aspects of engagement, interest, ease of use, accessibility, flexibility, and compatibility. Additionally, the data was subjected to analysis through the utilization of descriptive statistics, specifically frequency and percentage. Kite et al [35], explored student perceptions of using LMS through semi-structured interviews. They used convenience sampling to recruit participants. Then interview invitations were sent to the participants' emails. Interviews were conducted for 45 minutes. They explored student experiences using LMS (Canvas), likes and dislikes of LMS (Canvas) features, comparisons between Canvas and Blackboard, and their experiences with the technical and pedagogical support available on LMS (Canvas). Holmes & Prieto-Rodriguez [31], explored student perceptions of using LMS through questionnaires and interviews. A questionnaire was employed to investigate the efficacy of the different constituents of the Learning Management System (LMS), specifically Blackboard, utilizing a 4-point rating system. Meanwhile, interviews were used to explore the affordances of accessibility and interactivity.

### 3.3. *The Impact of LMS Usage on Students*

The Impact of LMS Usage on Students can be divided into two categories, namely LMS Usage Impact on Students' Achievement and LMS Usage Impact on Students' View. Both are discussed in detail below.

#### 3.3.1. *LMS Usage Impact on Students' Achievement*

The utilization of LMS has an impact on the academic performance of students across multiple disciplines, such as language [17], [36], mathematics [15], [33], [34], science [30], education [32], health [20], and technology [23], [40]. The positive impact of using the LMS on learning achievement can be seen from the difference in scores between students who use the LMS and those who do not use the LMS [23], [34], [36] or the difference in scores between students before using the LMS and after using the LMS [30].

Akay & Gumusoglu [36], identified the effect of LMS on the English proficiency exam with logistic regression. The findings of the study indicate that the LMS has a noteworthy and favorable impact on the English language proficiency assessment. This can be seen from the significance value of  $p = 0.01$  or  $<0.05$ . Furthermore, Shaame et al [33], analyzed the effectiveness of LMS in Geometry learning with ANCOVA. The results of his research show that LMS is effective in helping students understand mathematical concepts and improve their performance in learning. This can be seen from the average score of students who use the LMS of 9.15 and those who do not use the LMS of 7.97.

Oguguo et al [32], also tested differences in learning outcomes between students using LMS and students using CAI. The study's findings indicate that the average increase in academic achievement among students who utilized a LMS was greater than that of students who utilized Computer-Assisted Instruction (CAI). Furthermore, as per the ANCOVA analysis, a statistically significant distinction exists between the mean scores of pupils who utilized LMS and those who employed CAI.

The study conducted by Ojeda-Castro et al [34], aim to investigate the disparities in academic achievement among students who utilized the LMS and those who did not employ the LMS in the context of mathematical knowledge acquisition. The study revealed that the academic achievements of students who utilized the LMS were superior to those who did not utilize the LMS. Based on the findings of the data analysis utilizing descriptive statistics, it has been determined that the mean score for the control group is 60.47, whereas the mean score for the experimental group is 65.47.

The study conducted by Tezer and Çimşir [23], investigates the dissimilarities in academic achievements among students who utilize LMS and those who do not employ LMS in the context of Web Design Education. The study revealed that students who utilized the LMS exhibited superior learning outcomes in comparison to those who did not utilize the LMS. The t-test results indicate a significant disparity in academic performance between students who utilize the LMS and those who do not. The statistical significance of this observation is evident at a p-value of less than 0.05.

The impact of LMS (BERSAQURAL) on the scientific interpretation of students was investigated by Saputro et al [30]. The findings of the researcher suggest that the utilization of LMS has a beneficial impact on the scientific interpretation skills of students. The statistical significance of the observation is evident from the Wilcoxon test statistic of -4.802 and a p-value that is less than 0.05.

#### 3.3.2. *LMS Usage Impact on Students' View*

The impact of using LMS on students' views can be seen from the perception and satisfaction. Perception is a feeling obtained after going through an experience recorded through a stimulus and is felt by the organ and everyone has their own feelings even though they experience the same event [9]. Students' perceptions need to be formed in learning using LMS because it will affect satisfaction and results from online learning [35]. Perception and satisfaction found by researchers can be classified into two, namely positive perception and satisfaction and negative perception and satisfaction. From the articles reviewed, the researcher found that most students had positive perceptions and satisfaction with using the LMS.

The utilization of LMS in learning methods resulted in a statistically significant increase in mathematical proficiency among students, in comparison to those who solely received conventional forms of instruction [34]. LMS has a positive impact, helping students do assignments and explore new concepts through the use of LMS [38].

Students' perceptions of LMS are positive [38]. LMS helps students in terms of learning and educational interaction. The LMS facilitates students in their pursuit of knowledge by promoting exploration of novel concepts within the course. It ensures that students remain focused on their academic objectives, thereby enhancing their learning experience. Additionally, the LMS effectively communicates crucial information to students, thereby enabling them to comprehend and retain key concepts.

Within the context of educational social interactions, LMS facilitated a sense of ease and comfort for students in communicating through online mediums. Specifically, LMS provided a platform for students to establish dates and time frames for learning activities, as well as engage in online discussions that fostered a sense of community and belonging.

Students responded positively and felt comfortable in distance learning using LMS and were able to support internet-based teaching [9]. According to Ajijola et al [9], their study revealed that distance learners held a positive perception regarding the usefulness and ease of use of LMS. The indicator showing that learners' perceived usefulness of LMS is positive. Most students agree that it helps them in several ways, including: improves academic achievement, gives more control over learning, helps learn more efficiently, makes learning more effective, and enables easier material downloads. Meanwhile, the indicator showing that learners' perceived ease of use of LMS is positive which is that most of the students agree that by using LMS they quickly understand the LMS process, easy for them to become skillful in ICT, easy to download course materials, easy to get relevant materials, and easy to download course materials.

Furthermore, more than 80% of students positively perceive the use of LMS [19]. They agreed that LMS offers various widgets to engage students, easy to use in terms of downloading reading and video materials, flexible in time and space during the learning phase, convenient to post comments based on tasks given by a teacher, tracks their progress during the learning process and ensures they complete their work, and allows them to manage their class activity well. This is reinforced by changes in behavior and ways of communicating between students in solving the problems presented by the teachers after the problems can be solved.

More than 75% of students had a positive perception of using LMS [41]. It can be evaluated from two aspects of the assessment: ease of use and usefulness. Three of the four indicators on the ease of use aspect, namely resources easy, assignments easy, and feedback easy, were rated positively by more than 65% of students. Meanwhile, three of the four indicators on the user-to-use aspect, namely resources easy, assignments easy, and feedback easy, were also positive by more than 65% of students.

Most of the respondents agreed with LMS learning and felt that they benefited from learning through LMS with quality learning materials well conveyed to students [20]. Further research on the perceptions of participants students in using LMS get positive responses, students feel that using LMS can increase their motivation in learning in the EFL class [17].

Student satisfaction with using LMS in terms of five variables: system content, instruction information, interaction, technology quality, perceived learning management system usefulness, and perceived students' satisfaction [16]. The findings indicate that the majority of students (80%) reported positive levels of satisfaction across four out of five variables, specifically instruction information, interaction, technology quality, perceived learning management system usefulness, and perceived students satisfaction. The study conducted by Rizal et al [3], delves into the investigation of student satisfaction regarding the utilization of LMS (LMS3) through the examination of ten indicators. These indicators include application user-friendliness, communication interactivity, work collaboration, virtual lab access, teaching material availability, evaluation system, assessment variety, assignment submission, feedback quality, and synchronous learning. The results showed that the level of student satisfaction on all indicators was high.

Although most of the students' perceptions and satisfaction with using LMS are positive, there are also a small number of negative perceptions. This is caused by the less optimal use of LMS, so students do not feel the benefits of using LMS. The research results by Araka et al [42], showed that students experienced several obstacles in independent online learning using LMS. Based on the data obtained using the questionnaire, it is known the factors that prevent students from actively participating in online learning using LMS and areas that are not supported by teachers in online learning using LMS. Several factors impede students' active participation in online learning through LMS. These factors include insufficient internet connectivity, limited interaction with course instructors, inadequate personalized feedback on learning habits, insufficient instructor guidance, and inadequate peer interaction. Meanwhile, areas not supported by teachers in online learning using LMS include real-time feedback, individualized feedback, guided learning, and prompts guiding study habits. Likewise, students experience some difficulties using LMS (Moodle) in online learning. Some students struggle navigating the program and require technical support when introduced to the LMS (Moodle) [3943].

#### 4. Conclusion and Recommendation

Researchers use Learning Management System (LMS) to support online learning. The methods used to examine the impact of LMS usage on students include quantitative, qualitative, and mixed methods. Results suggest that using LMS positively affects students' academic performance in various disciplines.

Students have positive perceptions and satisfaction with using LMS, with features such as accessibility, flexibility, interactivity, and availability of learning materials. The literature review found that LMS has a positive impact on students' achievement and views, but some students have negative perceptions due to technical difficulties, limited interaction with instructors, and insufficient support.

To address these issues, researchers should use quantitative and qualitative methods to gain comprehensive insights. Institutions and instructors should provide adequate technical support and training to students, monitor and evaluate student perceptions and satisfaction, and actively engage with students through LMS. Future research should investigate the long-term impact of LMS usage on students' achievement and views.

## References

- [1]. Ozdamli, F., & Beyatli, O. (2013). Determining Student Internet Addiction Levels in Secondary Education and the Factors that Affect It. *Procedia - Social and Behavioral Sciences*, 8(2), 171–178.
- [2]. Turan, İ. (2010). Student readiness for technology enhanced history education in Turkish high schools. *Cypriot Journal of Educational Sciences*, 5(2), 94–106.
- [3]. Rizal, R., Rusdiana, D., Setiawan, W., & Siahaan, P. (2020). Students' Perception of Learning Management System Supported Smartphone: Satisfaction Analysis in Online Physics Learning. *JPII*, 9(4), 600–610. Doi:10.15294/jpii.v9i4.25363
- [4]. Tseng, H. (2020). An exploratory study of students' perceptions of learning management system utilisation and learning community. *Research in Learning Technology*, 28. Doi:10.25304/rlt.v28.2423
- [5]. Rizal, R., Setiawan, W., & Rusdiana, D. (2019). Digital literacy of preservice science teacher. *Journal of Physics: Conference Series*, 1157, 022058. Doi:10.1088/1742-6596/1157/2/022058
- [6]. Lin, M.H., Chen, H., & Liu, K.S. (2017). A Study of the Effects of Digital Learning on Learning Motivation and Learning Outcome. *EURASIA J MATH SCI T*, 13(7). Doi:10.12973/eurasia.2017.00744a
- [7]. Dobrota, M., Jeremic, V., & Markovic, A. (2012). A new perspective on the ICT Development Index. *Information Development*, 28(4), 271–280. Doi:10.1177/0266666912446497
- [8]. Naidu, N. (2017). How flexible is flexible learning, who is to decide and what are its implications? *Distance Education*, 38(3), 269–272. Doi:10.1080/01587919.2017.1371831
- [9]. Ajijola, E. M., Aladesusi, G. A., Ogunlade, O. O., & Olumorin, C. O. (2021). Perception of Learning Management System Among Distance Learners in South-West, Nigeria. *J. Dig. Learn. Edu.*, 1(2), 72–84. Doi:10.52562/jdle.v1i2.214
- [10]. Smith, Y., Chen, Y.J., & Warner-Stidham, A. (2021). Understanding online teaching effectiveness: Nursing student and faculty perspectives. *Journal of Professional Nursing*, 37(5), 785–794. Doi:10.1016/j.profnurs.2021.05.009
- [11]. Wang, J., Doll, W. J., Deng, X., Park, K., & Yang, M. G. (2013). The impact of faculty perceived reconfigurability of learning management systems on effective teaching practices. *Computers & Education*, 61, 146–157. Doi:10.1016/j.compedu.2012.09.005
- [12]. Allen, M. W. (2016). *Michael Allen's guide to e-learning: Building interactive, fun, and effective learning programs for any company (2nd ed.)*. Hoboken, New Jersey: John Wiley & Sons, Inc.
- [13]. Jung, I., & Lee, J. (2020). The effects of learner factors on MOOC learning outcomes and their pathways. *Innovations in Education and Teaching International*, 57(5), 565–576. Doi:10.1080/14703297.2019.1628800
- [14]. Patiar, A., et al. (2021). Hospitality Students' Acquisition of Knowledge and Skills through a Virtual Field Trip Experience. *Journal of Hospitality & Tourism Education*, 33(1), 14–28. Doi:10.1080/10963758.2020.1726768
- [15]. Widodo, S., Turmudi, T., & Rosjanuardi, R. (2021). Autonomy and Creative Thinking Skills of Prospective Elementary School Teacher Students in Learning Mathematics with Science Phenomena assisted by the Learning Management System. *International Journal of Learning, Teaching and Educational Research*, 20(8), 160–175. Doi:10.26803/ijlter.20.8.10
- [16]. Nguyen, N.T. (2021). A study on satisfaction of users towards learning management system at International University – Vietnam National University HCMC. *Asia Pacific Management Review*, 26(4), 186–196. Doi:10.1016/j.apmr.2021.02.001
- [17]. Zainuddin, Z., & Perera, C. J. (2018). Supporting students' self-directed learning in the flipped classroom through the LMS TES BlendSpace. *OTH*, 26(4), 281–290. Doi:10.1108/OTH-04-2017-0016
- [18]. Alenezi, A. (2018). Barriers to Participation in Learning Management Systems in Saudi Arabian Universities. *Education Research International*, 2018, 1–8. Doi:10.1155/2018/9085914
- [19]. Ganeser, A. N., & Robert, T. P. (2021). The Perception and Effectiveness of OpenLearning Portal as A Central Learning Management System (LMS) Among Private Higher Education Institution Students. *Asian Journal of Research in Education and Social Sciences*, 3(2), 54-62.
- [20]. Thepwongsa, I., Sripa, P., Muthukumar, R., Jenwitheesuk, K., Virasiri, S., & Nonjui, P. (2021). The effects of a newly established online learning management system: The perspectives of Thai medical students in a public medical school. *Heliyon*, 7(10), e08182. Doi:10.1016/j.heliyon.2021.e08182

- [21]. Aydin, C. C., & Tirkes, G. (2010). Open source learning management systems in e-learning and Moodle. In *IEEE EDUCON 2010 Conference*, 593–600. Madrid, Spain: IEEE. Doi:10.1109/EDUCON.2010.5492522
- [22]. Joo, Y. J., Kim, N., & Kim, N. H. (2016). Factors predicting online university students' use of a mobile learning management system (m-LMS). *Education Tech Research Dev*, 64(4), 611–630. Doi:10.1007/s11423-016-9436-7
- [23]. Tezer, M., & Çimşir, B. T. (2018). The impact of using mobile-supported learning management systems in teaching web design on the academic success of students and their opinions on the course. *Interactive Learning Environments*, 26(3), 402–410. Doi:10.1080/10494820.2017.1337037
- [24]. Jaggars, S. S., & Xu, D. (2016). How do online course design features influence student performance? *Computers & Education*, 95, 270–284. Doi:10.1016/j.compedu.2016.01.014
- [25]. Alshorman, B. A., & Bawaneh, A. K. (2018). Attitudes of Faculty Members and Students towards the Use of the Learning Management System in Teaching and Learning. *Turkish Online Journal of Educational Technology*, 17(3), 1–15.
- [26]. Altinpulluk, H., & Kesim, M. (2021). A systematic review of the tendencies in the use of learning management systems. *Turkish Online Journal of Distance Education*, 22(3), 40–54. Doi:10.17718/tojde.961812
- [27]. Krалева, R., Sabani, M., & Krалev, V. (2019). An analysis of some learning management systems. *International Journal on Advanced Science, Engineering and Information Technology*, 9(4), 1190. Doi:10.18517/ijaseit.9.4.9437
- [28]. Turnbull, D., Chugh, R., & Luck, J. (2021). Learning management systems: A review of the research methodology literature in Australia and China. *International Journal of Research & Method in Education*, 44(2), 164–178. Doi:10.1080/1743727X.2020.1737002
- [29]. Demiris, G., Oliver, D.P., & Washington, K. T. (2019). *Behavioral intervention research in hospice and palliative care: Building an evidence base*. Amsterdam: Academic Press.
- [30]. Saputro, B., Tortop, H. S., Zuhri, M., Mansur, M., & Saerozi, M. (2021). The Effectiveness of the Learning Management System of Saqural Learning Application on the Scientific Interpretation Learning Outcomes. *Jurnal Pendidikan IPA Indonesia*, 10(1), 111–120. Doi:10.15294/jpii.v10i1.27677
- [31]. Holmes, K., & Prieto-Rodriguez, E. (2018). Student and Staff Perceptions of a Learning Management System for Blended Learning in Teacher Education. *Australian Journal of Teacher Education*, 43(3), 21–34. Doi:10.14221/ajte.2018v43n3.2
- [32]. Oguguo, B. C. E., Nannim, F. A., Agah, J. J., Ugwuanyi, C. S., Ene, C. U., & Nzeadibe, A. C. (2021). Effect of learning management system on students' performance in educational measurement and evaluation. *Educ Inf Technol*, 26(2), 1471–1483. Doi:10.1007/s10639-020-10318-w
- [33]. Shaame, A. A., Anatory, J. R., Osaki, K. M., & Mrutu, S. I. (2020). Exploring a Learning Management System as a Way to Improve Students' Understanding of Geometry in Secondary Schools. *Africa Education Review*, 17(4), 17–40. Doi:10.1080/18146627.2020.1868070
- [34]. Ojeda-Castro, A. M., Murray-Finley, P., & Sánchez-Villafañe, J. (2017). Learning Management System Use to Increase Mathematics Knowledge and Skills in Puerto Rico. *International Journal of Technology and Human Interaction*, 13(2), 89–100. Doi:10.4018/IJTHI.2017040106
- [35]. Kite, J., Schlub, T. E., Zhang, Y., Choi, S., Craske, S., & Dickson, M. (2020). Exploring lecturer and student perceptions and use of a learning management system in a postgraduate public health environment. *E-Learning and Digital Media*, 17(3), 183–198. Doi:10.1177/2042753020909217
- [36]. Akay, E., & Gumusoglu, E.K. (2020). The Impact of Learning Management Systems on Students' Achievement in Language Exams. *Turkish Online Journal of Distance Education*, 206–222. Doi:10.17718/tojde.803410
- [37]. Al-Assaf, N., Almarabeh, T., & Eddin, L. N. (2015). A Study on the Impact of Learning Management System on Students of the University of Jordan. *Journal of Software Engineering and Applications*, 8(11), 590–601. Doi:10.4236/jsea.2015.811056
- [38]. Emmamoge, O., Bilkisu, H., Yahya, K., & Ahmed, M. I. (2020). The Impact of Learning Management System in Federal College of Forestry, Jos - A Case Study. *IIARD International Journal of Geography and Environmental Management*, 6(1).
- [39]. Buthelezi, L. I., & Van Wyk, J. M. (2020). The use of an online learning management system by postgraduate nursing students at a selected higher educational institution in KwaZulu-Natal, South Africa. *African Journal of Health Professions Education*, 12(4), 211. Doi:10.7196/AJHPE.2020.v12i4.1391
- [40]. Han, I., & Shin, W. S. (2016). The use of a mobile learning management system and academic achievement of online students. *Computers & Education*, 102, 79–89. Doi:10.1016/j.compedu.2016.07.003
- [41]. Chippis, J., Kerr, J., Brysiewicz, P., & Walters, F. (2015). A Survey of University Students' Perceptions of Learning Management Systems in a Low-Resource Setting Using a Technology Acceptance Model. *CIN: Computers, Informatics, Nursing*, 33(2), 71–77. Doi:10.1097/CIN.0000000000000123
- [42]. Araka, E., Maina, E., Gitonga, R., Oboko, R., & Kihoro, J. (2021). University Students' Perception on the Usefulness of Learning Management System Features in Promoting Self-Regulated Learning in Online Learning. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 17(1), 45–64. Doi:10.7196/AJHPE.2020.v12i4.1391