

IMPROVING DIGITAL LEARNING: EVALUATING THE U LEARN LMS WITH THE SYSTEM USABILITY SCALE

I Made Ardi Sudestra*¹), Ni Wayan Eva Agustini²), I Made Agus Oka Gunawan³),
Gede Indrawan⁴), Musawer Hakimi⁵)

1. Computer Science, Postgraduate, Universitas Pendidikan Ganesha, Indonesia
2. Computer Science, Postgraduate, Universtas Pendidikan Ganesha, Indonesia
3. Information Systems, Universitas Tabanan
4. Computer Science, Postgraduate, Universtas Pendidikan Ganesha, Indonesia
5. Computer Science Department, Samangan University, Samangan, Afghanistan

Article Info

Keywords: Online Learning Systems; System Usability Scale; User Experience; User Interface.

Article history:

Received 12 September 2024

Revised 16 Oktober 2024

Accepted 4 November 2024

Available online 4 December 2024

DOI :

<https://doi.org/10.29100/jipi.v9i4.6910>

* Corresponding author.

Corresponding Author

E-mail address:

ardi.sudestra@student.undiksha.ac.id

ABSTRACT

The assessment of the usability of online learning systems is becoming more and more critical in order to ensure that users have the best possible experience. This study employed the System Usability Scale (SUS) to assess the usability of the learning management system at UNDIKNAS, using 68 students from various academic programs as participants. The employed methodology is administering a SUS questionnaire consisting of 10 items on a Likert scale from 1 to 5. The points are computed using the standard SUS methodology and multiplied by 2.5 to derive the final score. The analysis disclosed an average SUS score of 56.65, falling short of the academic usability benchmark 68. The score distribution visualization indicated that most respondents rated between 50 and 60, highlighting the need for system improvement. The SUS assessment of the learning management system at UNDIKNAS reveals that the system's usability necessitates improvement. Key recommendations include improving the user interface, optimizing navigation, and providing user guides to enhance the overall user experience.

I. INTRODUCTION

TODAY, most schools and colleges use online learning management systems to supplement traditional classes [1]. With the growing adoption of these systems, there is an immediate need to make sure that the platforms are efficient and deliver a seamless user experience [2]. User satisfaction is an essential transition criterion of IT (Information Technology) and directly affects the degree of technology's employment by users, making it a critical factor for system usability evaluation tests on e-learning systems [3].

A widely used method to rate a system's usability is the well-known System Usability Scale (SUS) [4]. As a well-established tool in the field of usability assessment, SUS provides a standardized approach to measure user satisfaction and ease of use [5]. Its broad applicability makes it suitable for various types of systems, allowing researchers and practitioners to obtain reliable and comparable results across different studies and applications [5]

The SUS methodology is straightforward yet comprehensive, facilitating the assessment of both usability and overall effectiveness [6]. By employing this technique, researchers can systematically identify the strengths and weaknesses of the current system. This insight into the positive and negative aspects enables developers to make informed decisions for system improvements, ultimately enhancing user experience and better meeting user needs and expectations [7]

With the increasing adoption of learning management systems (LMS) in educational institutions, evaluating user experience quality has become essential [8]. The System Usability Scale (SUS) is a standard tool frequently used to measure system usability swiftly and accurately. Applying SUS in LMS evaluation helps identify primary user issues, allowing institutions to respond with relevant improvements.

In line with this approach, this study assesses the usability of the Learning Management System (LMS) at Universitas Pendidikan Nasional (UNDIKNAS). The primary goal is to identify critical areas for improvement by leveraging the SUS tool to evaluate how well the LMS meets user needs and expectations. Through this assessment, this research contributes to the LMS evaluation literature by highlighting specific areas in the UNDIKNAS LMS

that require enhancement. The findings serve as a potential reference for other educational institutions aiming to improve their LMS functionality, thereby enriching the online learning experience for users.

In the evaluation, 68 students from various courses completed a System Usability Scale (SUS) questionnaire. The primary aim of the study is to evaluate the user-friendliness of the UNDIKNAS LMS and to identify critical areas that require improvement [5]. By examining whether the LMS effectively supports user requirements, institutions can enhance the learning process through necessary modifications [9].

Furthermore, this research endeavors to measure the system's usability and provide qualitative recommendations for the development of online learning within educational organizations. The insights gained from this study offer valuable guidance for improving LMS platforms, ensuring they better meet the needs of students and educators alike [10]. Ultimately, the findings contribute to the ongoing effort to develop more effective and user-centric online learning environments in educational institutions. The recommendations derived from this research aim to enhance the LMS platform at UNDIKNAS and guide similar improvements at other institutions, supporting a more engaging and efficient online learning environment.

II. METHOD

The System Usability Scale (SUS) is a widely recognized tool for assessing the usability of various systems, including Learning Management Systems (LMS). Its application in educational settings is particularly significant as it correlates with user experience and effectiveness in learning environments. The SUS consists of ten questions rated on a Likert scale from 1 to 5, allowing for a straightforward evaluation of usability from the user's perspective [11]. This method has been shown to provide reliable insights into how effectively users can interact with LMS platforms, which is critical for enhancing educational outcomes [12].

To calculate the SUS score, each item's score is first adjusted. For odd-numbered items, subtract one from the user's score, and for even-numbered items, subtract the user's score from five. Then, the adjusted values are summed and multiplied by 2.5 to convert the total from a range of 0-40 to 0-100. While the scores are presented on a 0-100 scale, they represent percentile rankings rather than percentages. A SUS score above 68 is considered above average, while a score below 68 is considered below average. This single score offers a comprehensive measure of the system's overall usability.

The first step in the study was the preparation of research instruments, which were adapted from the work of Sharfina and Santoso [13]. The table of research instruments is provided in Table 1.

TABEL I
 SYSTEM USABILITY SCALE (SUS) QUESTIONNAIRE FOR EVALUATING THE LMS PERFORMANCE AT UNDIKNAS

No	SUS Questions	Likert Scale (1-5)
1	I think that I would like to use this system frequently.	1 - 5
2	I found the system unnecessarily complex.	1 - 5
3	I thought the system was easy to use.	1 - 5
4	I think that I would need the support of a technical person to be able to use this system.	1 - 5
5	I found the various functions in this system were well integrated.	1 - 5
6	I thought there was too much inconsistency in this system.	1 - 5
7	I would imagine that most people would learn to use this system very quickly.	1 - 5
8	I found the system very cumbersome to use.	1 - 5
9	I felt very confident using the system.	1 - 5
10	I needed to learn a lot of things before I could get going with this system.	1 - 5

Once the research instruments were meticulously developed and finalized, they were systematically distributed to the selected participants. To ensure that participants in this study accurately represent the student population at UNDIKNAS, several selection criteria were carefully considered. A total of 68 students were chosen to capture the academic diversity within UNDIKNAS, representing a wide range of perspectives, experiences, and needs in using the Learning Management System (LMS). First, participants were selected based on their faculty and academic program, including students from fields such as social sciences, economics, technology, and humanities. This was essential to ensure each discipline was well represented, allowing the study's findings to reflect the unique needs and challenges faced by different areas of study in utilizing the LMS.

In addition, participants' educational levels were considered, with students selected from various stages of their academic journey, from early-year students to those nearing graduation. This variation in educational level was expected to reflect differences in LMS usage and requirements, as final-year students may have deeper insights

into the academic system compared to newer students. Furthermore, diversity in LMS usage experience was taken into account, with some participants being active users who frequently engage with the platform and others using it only occasionally. This approach enables the study to understand how the LMS serves users with different levels of engagement.

Demographic factors such as age, gender, and regional background were also considered to create an inclusive representation of the diverse UNDIKNAS student body. This allowed the study to explore whether there were differences in LMS experiences based on demographic background. Finally, selected participants demonstrated a willingness to actively engage in the study through surveys. Active participation was crucial for obtaining valid and in-depth data on the LMS evaluation, ensuring a more accurate assessment of the platform's strengths and weaknesses.

Through these criteria, participant selection aimed to ensure that the 68 students involved in this study would provide a comprehensive and diverse representation of the student population, ultimately helping to generate relevant and practical recommendations for future LMS development [14]



Source: www.flowmapp.com

Figure 1. SUS Score Interpretation Chart: Usability Ratings and Grading Scale

This figure depicts a System Usability Scale (SUS) rating interpretation chart. The SUS score ranges from 0 to 100 and is divided into three major categories: "Not Acceptable," "Marginal," and "Acceptable" [5]. The scale includes an adjective rating from "Worst Imaginable" to "Best Imaginable," correlating the scores to subjective user feedback. The acceptable range starts at a score of approximately 70, where the system usability transitions from "OK" to "Good" and higher.

The chart also includes a grade scale, where a score below 50 receives an "F," indicating poor usability, while scores above 70 are graded between "C" to "A," with higher scores representing better usability. This visual aids in evaluating the overall usability experience of a system, providing a clear connection between the SUS score, adjective description, and grade-based interpretation.

III. RESULT AND DISCUSSION

In this study, the U Learn Learning Management System (LMS) performance evaluation at UNDIKNAS was conducted using the System Usability Scale (SUS). The data was collected through a SUS questionnaire consisting of 10 items on a Likert scale, where respondents rated each item from 1 (Strongly Disagree) to 5 (Strongly Agree) [15], [16]

The responses were processed based on question type. Positive questions (Q1, Q3, Q5, Q7, Q9) were scored by subtracting 1 from the given score, while negative questions (Q2, Q4, Q6, Q8, Q10) were scored by subtracting the given score from 5. The total adjusted score for each respondent was summed and multiplied by 2.5 to produce a final SUS score ranging from 0 to 100. This method ensures consistency in scoring and provides a comprehensive view of the LMS's usability. The average SUS score was then calculated to assess the overall user experience and identify improvement areas.

The average SUS score was calculated to be 56.65. This score indicates that the overall usability of the U Learn LMS is below the industry standard of 68. To calculate the average SUS score, each respondent's SUS score was calculated using the following formula:

$$SUS = (i = 1,3,5,7,9 \sum (Skori - 1) + i = 2,4,6,8,10 \sum (5 - Skori)) \times 2.5$$

Positive Scores: The sum of scores for positive questions (Q1, Q3, Q5, Q7, Q9), adjusted by subtracting 1 from each score. Negative Scores: The sum of scores for negative questions (Q2, Q4, Q6, Q8, Q10), adjusted by subtracting the score from 5.

The average SUS score was then computed by taking the mean of all individual SUS scores. A lower-than-expected average SUS score suggests that the U Learn LMS's usability needs improvement.

A. Learning Management System Undiknas

Learning Management System (LMS) at UNDIKNAS is designed to support students in managing and participating in various courses with ease. Its primary functionality allows students to quickly access and manage their enrolled courses [17]. Each course is displayed in a card format, providing essential information such as the instructor's name, class schedule, participant count, and course code. The search feature at the top also enables students to easily enroll in new courses as needed for their academic requirements.

Additionally, the LMS helps students stay updated with real-time information, such as the number of participants enrolled and upcoming class schedules. Simple navigation menus like "My Course" and "Enrolled Course" make it easy for students to access both active and archived courses, allowing them to track their academic progress efficiently. The intuitive and informative interface provides a seamless experience, ensuring that students can focus on their studies without encountering technical difficulties [18].

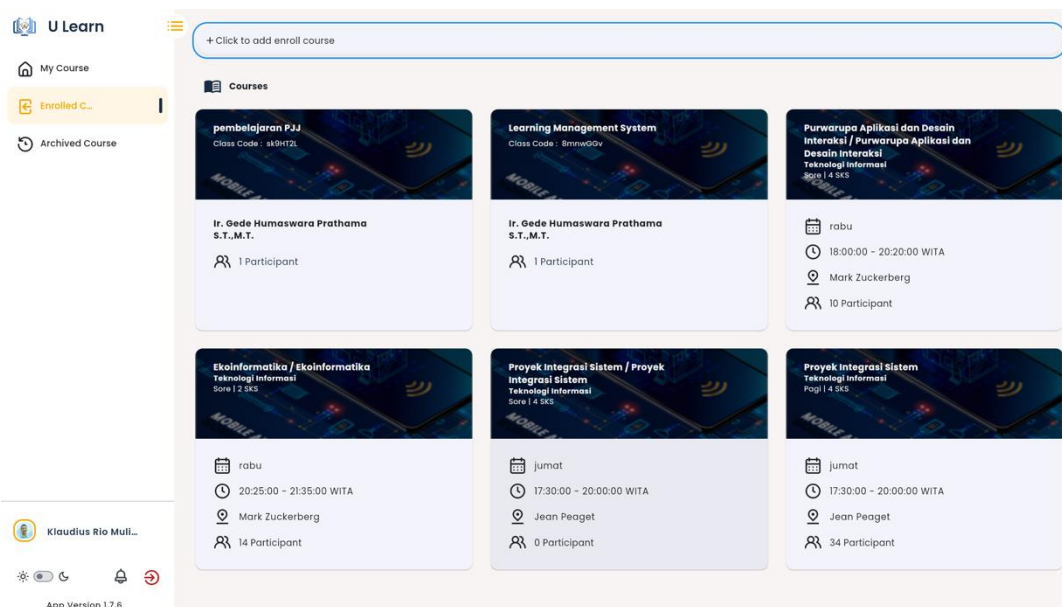


Figure 2. LMS: Course Overview and User Interface at UNDIKNAS

B. SUS Score Distribution

The data analysis yielded the average SUS score based on respondents' answers. The distribution of SUS scores is displayed in a histogram showing the frequency distribution of these scores. The histogram indicates that the SUS scores are distributed across various categories, with the highest frequency occurring within the score range of 50 to 60 range, indicating that users found the system somewhat usable but not exceptional. A small portion of users rated below 50, reflecting some dissatisfaction.

Overall, while most users had a relatively comfortable experience, the varying scores highlight areas where improvements are needed to enhance the system [19].

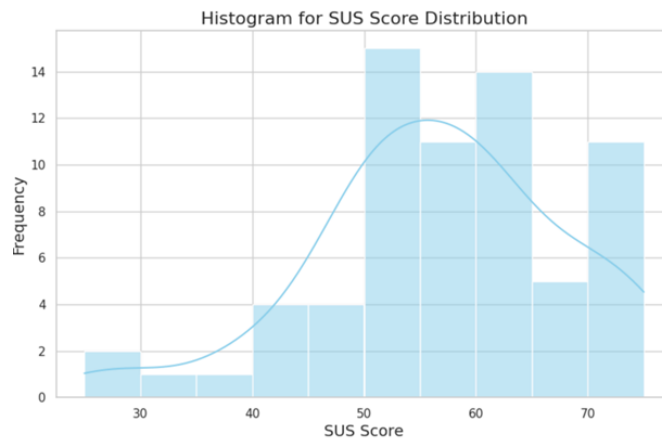


Figure 2. Distribution of SUS Scores: Visualizing User Satisfaction

C. Average SUS Score

The low average SUS score of 56.65 indicates that the U Learn LMS faces usability challenges, impacting both user experience and the platform's effectiveness as a learning tool [20], [21]. For students, this score suggests that many may struggle to navigate the platform, which can hinder their access to learning materials and assignments. Students who encounter difficulties with the LMS may spend more time figuring out the interface and dealing with administrative tasks, detracting from time that could be better spent on actual learning. Additionally, a poor user experience can lead to frustration, reduced motivation, and potentially lower academic performance.

For instructors, a low SUS score affects the efficiency of delivering content and interacting with students. A less user-friendly LMS can hinder instructors' ability to manage learning materials, upload assignments, and provide timely feedback to students. Instructors may also need to dedicate additional time to guide students on how to use the LMS, taking away from time that could be spent on teaching or preparing materials. These usability issues may lead to both instructors and students using the LMS less frequently or effectively, diminishing its potential as a learning platform.

Overall, the low SUS score highlights the need for improvements to make the LMS more intuitive and accessible. This usability issue implies a reduced effectiveness of the LMS as an educational tool, leading to suboptimal user experiences for both students and instructors. Regular updates to enhance interface design, navigation, and user support are essential to ensure that the LMS fully supports the learning process at UNDIKNAS [22]

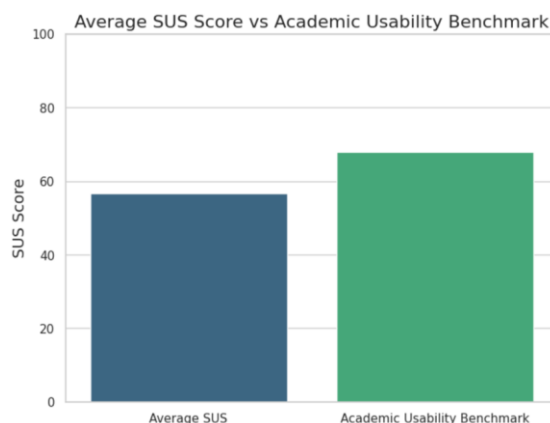


Figure 2. Comparison of Average SUS Score and Academic Usability Benchmark

D. Visualization of SUS Score Spread

Further analysis using a box plot offers a detailed view of the SUS score distribution. The plot shows that the scores range from a minimum of around 30 to a maximum of around 75, with several outliers at the lower end. These outliers suggest that a few respondents had notably negative experiences with the LMS.

The median score appears close to 60, not 70, indicating that most users provided moderate ratings. While the system is rated relatively well overall, the presence of low outliers suggests usability issues that need to be addressed in future improvements [22].

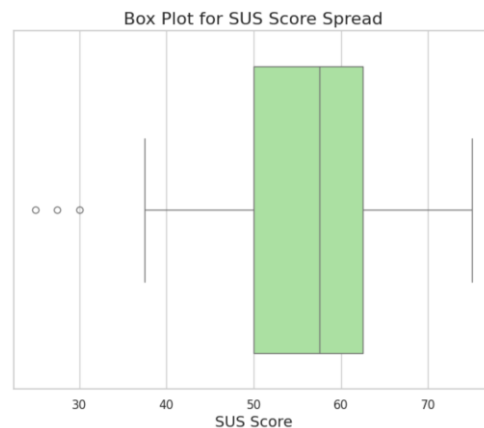


Figure 2. Box Plot of SUS Score Distribution: Identifying Variability and Outliers

Based on the findings from this study, several concrete recommendations can be made to improve the U Learn LMS at UNDIKNAS, particularly to enhance the SUS score and overall user experience. The first step is to conduct an in-depth analysis of user feedback, especially from those who provided lower scores. By categorizing feedback into specific areas such as navigation ease, responsiveness, and feature reliability, the development team can focus on addressing the primary issues affecting users. Additionally, improving the user interface (UI) is essential, which may include streamlining the layout, reducing the number of steps required to complete tasks, and enhancing visual elements like colors and icons to make the platform more intuitive.

Optimizing the LMS's performance should also be a priority. This involves improving page load speeds, reducing bugs or errors, and ensuring responsiveness on mobile devices so that users can seamlessly access the LMS across various devices. Enhanced training and user support are also recommended, such as offering interactive tutorials within the system to assist users, especially newcomers, in navigating the LMS more efficiently. Furthermore, conducting continuous user testing will be invaluable in gathering direct feedback, enabling the identification of areas needing improvement before updates are widely implemented [23].

Practically, the study's findings can serve as a direct guide for the development team to prioritize enhancements based on user input. These recommendations can inform the development of the next version of the LMS, addressing specific concerns raised by users. Additionally, this study contributes to the academic literature on LMS evaluation using the SUS framework, highlighting the importance of user feedback in the development lifecycle. This research, therefore, can serve as a valuable reference in discussions on LMS evaluation within the educational domain, providing practical insights into how user feedback can be effectively utilized to enhance LMS systems in educational institutions [24].

IV. CONCLUSION

The evaluation of the U Learn Learning Management System (LMS) at UNDIKNAS, using the System Usability Scale (SUS), shows that the system falls short of usability expectations. With an average SUS score of 56.65, the LMS did not meet the academic benchmark of 68, indicating the need for further improvement.

While some users gave positive feedback, lower scores from others highlight usability challenges that must be addressed. Future efforts should focus on fixing technical issues, improving interface design, and refining functionalities to provide a more seamless and effective learning experience. Prioritizing user feedback will ensure the LMS becomes a more reliable tool for digital learning and academic support.

REFERENCES

- [1] M. Furqon, P. Sinaga, L. Liliyasi, and L. S. Riza, "The Impact of Learning Management System (LMS) Usage on Students," *TEM Journal*, vol. 12, no. 2, pp. 1082–1089, 2023, doi: 10.18421/TEM122-54.
- [2] Y. Wang and Y. Liu, "Evaluation System of CG Art Communication Platform Based on User Experience," *IEEE Access*, vol. 10, no. November, pp. 128742–128753, 2022, doi: 10.1109/ACCESS.2022.3227931.
- [3] M. A. Alterkait and M. Y. Alduaij, "Impact of Information Quality on Satisfaction with E-Learning Platforms: Moderating Role of Instructor and Learner Quality," *Sage Open*, vol. 14, no. 1, pp. 1–13, 2024, doi: 10.1177/21582440241233400.
- [4] H. Cao *et al.*, "Barriers and Enablers to the Implementation of Intelligent Guidance Systems for Patients in Chinese Tertiary Transfer Hospitals: Usability Evaluation," *IEEE Trans Eng Manag*, vol. 70, no. 8, pp. 2634–2643, 2023, doi: 10.1109/TEM.2021.3066564.
- [5] N. Clark, M. Dabkowski, P. J. Driscoll, D. Kennedy, I. Kloo, and H. Shi, "Empirical Decision Rules for Improving the Uncertainty Reporting of Small Sample System Usability Scale Scores," *Int J Hum Comput Interact*, vol. 37, no. 13, pp. 1191–1206, 2021, doi: 10.1080/10447318.2020.1870831.
- [6] Y. W. Hsieh, M. T. Lee, C. C. Chen, F. L. Hsu, and C. Y. Wu, "Development and user experience of an innovative multi-mode stroke rehabilitation system for the arm and hand for patients with stroke," *Sci Rep*, vol. 12, no. 1, pp. 1–9, 2022, doi: 10.1038/s41598-022-05314-8.
- [7] B. P. Knijnenburg, M. C. Willemsen, Z. Gantner, H. Soncu, and C. Newell, "Explaining the user experience of recommender systems," *User Model User-adapt Interact*, vol. 22, no. 4–5, pp. 441–504, 2012, doi: 10.1007/s11257-011-9118-4.
- [8] V. Sexton, J. Dale, and H. Atherton, "An evaluation of service user experience, clinical outcomes and service use associated with urgent care services that utilise telephone-based digital triage: a systematic review protocol," *Syst Rev*, vol. 10, no. 1, p. 25, Dec. 2021, doi: 10.1186/s13643-021-01576-x.
- [9] A. Sütöová, K. Teplická, and M. Straka, "Application of the EFQM Model in the Education Institution for Driving Improvement of Processes towards Sustainability," *Sustainability (Switzerland)*, vol. 14, no. 13, 2022, doi: 10.3390/su14137711.
- [10] "Weir, C. J., Heazell, A., Whyte, S., & Norman, J. E. (2020). Evaluating improvement interventions using routine data to support a learning health system: research design, data access, analysis and reporting. *BMJ Quality and Safety*. <https://doi.org/10.1136/bmjqs-2019-010068> University of Bristol - Explore Bristol Research," 2020.
- [11] Kurniawan Malik Ibrahim, Ati Suci Dian Martha, and Dawam Dwi Jatmiko Suwawi, "Implementation of the Learner Centered Design method and the personality approach (Case Study: Redesigning The Interface mobile LMS Tel-U)," *International Journal on Information and Communication Technology (IJICT)*, vol. 9, no. 1, pp. 57–72, 2023, doi: 10.21108/ijict.v9i1.723.
- [12] K. Orfanou, N. Tselios, and C. Katsanos, "Perceived usability evaluation of learning management systems: Empirical evaluation of the system usability scale," *International Review of Research in Open and Distributed Learning*, vol. 16, no. 2, pp. 227–246, 2015, doi: 10.19173/irrodl.v16i2.1955.
- [13] Z. Sharfina and H. B. Santoso, "An Indonesian adaptation of the System Usability Scale (SUS)," *2016 International Conference on Advanced Computer Science and Information Systems, ICACISIS 2016*, pp. 145–148, 2017, doi: 10.1109/ICACISIS.2016.7872776.
- [14] M. Hammer, R. Göllner, K. Scheiter, B. Fauth, and K. Stürmer, "For whom do tablets make a difference? Examining student profiles and perceptions of instruction with tablets," *Comput Educ*, vol. 166, no. May 2020, 2021, doi: 10.1016/j.compedu.2021.104147.
- [15] J. Hasudungan, F. Arifianto, and H. T. Y. Achsan, "The Use of System Usability Scale as an Evaluation of Shopee PayLater," *JUPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)*, vol. 9, no. 1, pp. 416–423, Mar. 2024, doi: 10.29100/jupi.v9i1.5411.
- [16] A. I. Fanada and N. Nurgiyatna, "WEBSITE-BASED IMPLEMENTATION IN INFORMATION SYSTEMS FOR SUPERVISORY MANAGEMENT PURPOSES," *JUPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)*, vol. 9, no. 3, pp. 1395–1407, Aug. 2024, doi: 10.29100/jupi.v9i3.5341.
- [17] S. Vasanth and C. S. Sumathi, "Learning Management Systems through Moodle and Google Classroom for Education," *Adv Res*, vol. 21, no. 10, pp. 32–37, 2020, doi: 10.9734/air/2020/v21i1030249.
- [18] S. Mehroliya, S. Alagarsamy, and M. Indhu Sabari, "Moderating effects of academic involvement in web-based learning management system success: A multigroup analysis," *Heliyon*, vol. 7, no. 5, p. e07000, 2021, doi: 10.1016/j.heliyon.2021.e07000.
- [19] J. Todd, A. Gepp, B. Richards, and B. J. Vanstone, "Improving mortality models in the ICU with high-frequency data," *Int J Med Inform*, vol. 129, pp. 318–323, 2019, doi: 10.1016/j.ijmedinf.2019.07.002.
- [20] L. F. Sánchez-Peralta *et al.*, "SUBJECTIVE USABILITY VALIDATION OF A LEARNING MANAGEMENT SYSTEM FOR ONLINE TRAINING OF MINIMALLY INVASIVE SURGERY: COMPARISON BETWEEN EXPERTS AND STUDENTS," *British Journal of Surgery*, vol. 110, no. Supplement_1, Jan. 2023, doi: 10.1093/bjs/znac443.021.

- [21] K. Orfanou, N. Tselios, and C. Katsanos, “Perceived usability evaluation of learning management systems: Empirical evaluation of the System Usability Scale,” *The International Review of Research in Open and Distributed Learning*, vol. 16, no. 2, Apr. 2015, doi: 10.19173/irrodl.v16i2.1955.
- [22] S. Lehong, J. van Biljon, and I. Sanders, “Usability Requirements for Learning Management Systems in Open Distance Electronic Learning Environments: Considering Lecturers’ Views on Students’ Needs,” *Int J Hum Comput Interact*, vol. 40, no. 3, pp. 567–583, 2024, doi: 10.1080/10447318.2022.2121205.
- [23] A. S. Aljaloud *et al.*, “A Deep Learning Model to Predict Student Learning Outcomes in LMS Using CNN and LSTM,” *IEEE Access*, vol. 10, pp. 85255–85265, 2022, doi: 10.1109/ACCESS.2022.3196784.
- [24] A. G. Pradnya Sidhawara, “Evaluation of UAJY Learning Management System’s Usability using USE Questionnaire and Eye-tracking,” *Indonesian Journal of Information Systems*, vol. 4, no. 2, Feb. 2022, doi: 10.24002/ijis.v4i2.5273.