مجلة جامعة صحار للأعمال المستدامة
Sohar University Journal of Sustainable Business
Sohar University Journal of Sustainable Business
e-ISSN: 3007-5572 | Volume 2, Issue 1, 102-117
DOI: 10.69983/SUJSB/0201/27, January 2026

Enhancing Sustainable Digital Learning Practices in Higher Education: A Descriptive Analysis of Moodle Adoption Using the UTAUT Framework

Ilaf Salim Ali Al-Dhahab[a], Miaad Ahmed Mohammed Al-Balushi[b], Muna Musallm Issa Al-Maashani[c]

[a, b,c]College of Commerce and Business Administration, Dhofar University, Salalah, Oman

ABSTRACT

This study examines the acceptance and utilization of the Moodle Learning Management System (LMS) among undergraduate students in higher education, applying the Unified Theory of Acceptance and Use of Technology (UTAUT) as the theoretical framework. The research aims to identify the key factors influencing student engagement with Moodle and assess patterns of actual usage. A quantitative approach was employed, using a structured questionnaire to collect data from 164 participants. Descriptive statistics were conducted to evaluate perceptions of the four core UTAUT constructs: performance expectancy, effort expectancy, social Influence, and facilitating conditions. Results reveal a moderate level of Moodle utilization, with effort expectancy and facilitating conditions emerging as the most significant perceived aspects for students. The findings highlight the importance of institutional support, intuitive design, and effective training to foster meaningful e-learning engagement. The study offers practical insights for educational institutions seeking to enhance technology integration and recommends future research that incorporates additional variables and cross-institutional comparisons.

Keywords: Moodle, Learning Management System, UTAUT, higher education, technology acceptance, student engagement, e-learning.

Paper Type: *Research Paper*

INTRODUCTION

Teaching and learning are inherently interdependent processes. The effectiveness of one relies significantly on the other, where teaching aims to create engaging environments that support student learning and foster meaningful understanding. As emphasized by Susana and Nurdyansyah (2023), learning is a dynamic process shaped by experience, enhancing both current performance and future learning capacity.

Traditional education systems predominantly emphasized rote memorization and factual recall, delivered through rigid, chapter-by-chapter instruction and standardized assessments. While these approaches focused on content coverage, they often failed to develop essential 21st-century skills such as critical thinking, creativity, and collaboration. In contrast, modern educational paradigms stress active, student-centered learning, underpinned by experiential activities, leadership cultivation, and communicative competence (Redecker et al., 2020).

The current technological era has significantly transformed educational practices. Digital tools such as video conferencing platforms, interactive multimedia, cloud-based learning content, and Learning Management Systems (LMS) have become integral to modern pedagogy. These technologies promote learner autonomy, real-time collaboration, improved time management, and multimodal engagement (Al-Fraihat et al., 2020; Raza et al., 2021).

Among these tools, Learning Management Systems (LMS) are pivotal in supporting both face-to-face and online education. Ariffin et al. (2014a) argue that LMS platforms foster institutional-level integration of technology-mediated instruction, enabling access to learning content and communication with instructors and peers. E-learning, often facilitated through LMS platforms, incorporates both synchronous and asynchronous modalities, supporting blended and fully online delivery. As Ariffin et al. (2014b) further observe, e-learning and LMS are closely linked, especially in facilitating flexible, personalized learning experiences.

Functionally, an LMS is a software application designed to manage educational content, automate instructional processes, and track learner progress. Students can use LMS platforms to access materials, submit assignments, engage in discussions, and monitor performance. The concept of LMS dates back to early instructional machines in the 20th century, yet contemporary LMS applications like Moodle have evolved significantly, particularly post-2019 when online learning surged due to the COVID-19 pandemic (Dhawan, 2020).

Moodle, an open-source and secure LMS, is widely adopted across higher education institutions for its modular design and adaptability. It supports diverse learning strategies, from traditional delivery to flipped classrooms and competency-based education. Its tools simulate classroom interactions, offering forums, quizzes, feedback, and assignment workflows (Moodle, 2018).

Despite the widespread adoption of LMS platforms, challenges persist in their optimal implementation. Common barriers include usability limitations, insufficient technical

support, lack of student training, difficulty accessing quality learning materials, and technological disparities in rural or under-resourced regions (Aldahwan & Alsaeed, 2020; Al-Fraihat et al., 2020). These challenges can reduce student satisfaction and limit the pedagogical potential of LMS environments.

Valcheva and Todorov (2012) noted the continuous evolution of e-learning tools and highlighted the need for system-level evaluation to ensure effective deployment. More recently, Davidson-Shivers (2018) and Raza et al. (2021) underscored a critical research gap in understanding user satisfaction, learning outcomes, and behavioral engagement in web-based platforms. These issues are particularly relevant in post-pandemic educational recovery efforts, where institutions are increasingly reliant on LMS technologies.

At Dhofar University's College of Commerce and Business Administration (CCBA), Moodle serves as the central platform for instructional delivery and student engagement. However, successful integration requires more than mere access; students must meaningfully interact with Moodle features to compensate for limited face-to-face instruction. Given the structured, time-constrained nature of academic semesters, it is essential to examine how students use Moodle and what factors influence their engagement.

This study examines the extent of Moodle use and the key factors influencing student engagement at Dhofar University. Using the UTAUT framework, it investigates students' perceptions of the system based on descriptive data, without testing causal relationships among variables.

RESEARCH OBJECTIVES AND SCOPE

The primary objective of this study is to investigate the extent and determinants of student utilization of the Moodle Learning Management System (LMS) at the College of Commerce and Business Administration (CCBA), Dhofar University. Specifically, the study aims to:

1. Identify the level of student utilization of Moodle LMS features.
2. Identify key factors influencing Moodle LMS usage from students' perspectives.
3. Describe the patterns of Moodle usage and engagement.

A quantitative descriptive research design was used, based on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). Data were collected from 164 undergraduate students using a structured questionnaire distributed online via

Google Forms. The findings are descriptive and provide a profile of students' engagement with Moodle and their perceptions of the four primary UTAUT constructs.

The scope is limited to CCBA students, but the insights apply to similar institutions. The study contributes to understanding how digital platforms can support sustainable educational practices and the transformation of business education (Davidson-Shivers, 2018).

LITERATURE REVIEW

Learning Management Systems in Higher Education

The integration of Learning Management Systems (LMS) into higher education has become a cornerstone of digital pedagogy, offering institutions a centralized platform for managing, delivering, and evaluating educational content. LMS platforms enable asynchronous and synchronous learning, streamline administrative processes, and enhance communication between educators and students (Aldahwan & Alsaeed, 2020). These systems support pedagogical functions such as course content distribution, assignment management, online assessments, and progress tracking, thereby fostering greater instructional efficiency and student engagement.

In recent years, LMS design has evolved significantly. A 2024 comparative analysis of 45 LMS platforms identified a shift toward prioritizing user interaction quality, system scalability, and built-in pedagogical tools (Sanchez et al., 2024). Institutions now consider LMS selection not only in terms of technological infrastructure but also in terms of teaching effectiveness and learner outcomes.

One of the most widely adopted platforms globally is Moodle, an acronym for Modular Object-Oriented Dynamic Learning Environment. As an open-source LMS licensed under the GNU General Public License, Moodle is valued for its flexibility, modular architecture, and cost-effectiveness (Moodle, 2018). Moodle supports blended learning, flipped classrooms, and fully online education by offering a suite of integrated tools, including discussion forums, quizzes, surveys, wikis, and multimedia embedding (Valcheva & Todorov, 2012).

Moodle and Student-Centered Learning

The pedagogical affordances of Moodle align with contemporary models of student-centered learning. Through self-paced access to course materials, personalized feedback, and interactive peer collaboration, Moodle fosters autonomous and reflective learning. A recent study by Romero and Ventura (2024) using learning analytics highlighted Moodle's capability to track real-time engagement data, enabling early academic interventions and informed instructional decision-making.

Moodle's adaptability is particularly advantageous in diverse educational settings. Educators can customize their courses with collaborative tools (e.g., wikis, chatrooms), assessment instruments (e.g., quizzes, rubrics), and communication channels (e.g., forums, announcements). Students benefit from an intuitive user interface and consistent access to learning resources,attributes that are especially critical in hybrid or distance education models (Davidson-Shivers, 2018; Korsah, 2024).

In Oman and other developing countries, Moodle is increasingly being adopted as the primary LMS in public and private universities. Its localized customization options and support for multilingual interfaces make it a practical solution for higher education institutions facing resource constraints (Al Naabi., 2023). This positions Moodle as both a technical and pedagogical tool for sustainable digital transformation in education.

UTAUT Framework in Technology Adoption Research

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003), is a dominant theoretical model used to examine technology adoption behavior. Synthesizing constructs from eight earlier models,including the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Diffusion of Innovations (DOI),UTAUT identifies four core determinants of technology use:

- **Performance Expectancy (PE):** The perceived benefit of using the system to achieve academic or task-related outcomes.
- **Effort Expectancy (EE):** The perceived ease of use and learning curve associated with the system.
- **Social Influence (SI):** The degree to which students perceive that influential others believe they should use the system.
- **Facilitating Conditions (FC):** The perceived availability of institutional support and technological infrastructure.

These constructs collectively explain up to 70% of the variance in behavioral intention and actual system use (Venkatesh et al., 2003). UTAUT has been widely applied in

educational contexts, including studies on mobile learning, online assessments, and virtual classrooms (Raza et al., 2021). Recent work by Zhou and Liang (2025) emphasizes the importance of integrating UTAUT with learning analytics to gain a more granular understanding of behavioral patterns in LMS use. Meanwhile, Korsah (2024) employed UTAUT to evaluate Moodle adoption during emergency remote teaching, underscoring the importance of perceived service quality and social Influence in technology uptake among faculty and students. The application of UTAUT is particularly relevant in the context of Dhofar University, where Moodle adoption is mediated by factors such as internet access, digital literacy, and institutional readiness. Incorporating UTAUT into this research allows for the systematic investigation of behavioral intention and actual system usage, thus providing actionable insights into the efficacy of LMS deployment in higher education.

Methodology

Research Design

A quantitative descriptive approach was used to assess students' utilization and perceptions of Moodle. The study involved three stages: literature review, questionnaire design, and descriptive data analysis.

Sampling and Data Collection

The sample comprised 164 undergraduate students from CCBA, Dhofar University. Data were collected using a structured online questionnaire. The Alpha Cronbach Coefficient was used to determine which numbers belong to which section and to assess the questionnaire's reliability. According to Privitera (2017), the value should be above 0.85 when the sample size is small. Therefore, SPSS-based Cronbach's alpha reliability analysis was used for testing. Based on 22 responses, the reliability value was 0.866. This shows that the questionnaire is a valid research tool for this study.

Table 1: Reliability Analysis

Case Processing Summary			
		N	%
Cases	Valid	22	100.0

	Excluded [a]	0	.0
	Total	22	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics	
Cronbach's Alpha	N of Items
.866	6

Instrumentation

Primary data were collected via an online questionnaire adapted from Venkatesh et al.'s (2003) UTAUT instrument. The questionnaire was divided into three sections:

- **Section A**: Collected demographic information such as age, gender, and prior experience.
- **Section B**: Measured constructs from the UTAUT model: performance expectancy, effort expectancy, social Influence, facilitating conditions, behavioral intention, and actual use behavior.
- **Section C**: Captured students' frequency of usage of specific Moodle features.

A pilot study was conducted to assess the instrument's reliability, yielding a Cronbach's Alpha of 0.866, indicating high internal consistency. Data were analyzed using descriptive statistics and Pearson correlation tests to explore the relationships among variables. The questionnaire included demographic information and items measuring the four UTAUT constructs using a five-point Likert scale. The focus was on summarizing students' perceptions of Moodle's usability, support, and benefits.

Data Analysis

Data were analysed using descriptive statistics in SPSS. The analysis focused on summarising respondents' demographic profiles and capturing overall patterns of Moodle usage and students' perceptions of the UTAUT constructs. Specifically,

frequencies and percentages were calculated to describe categorical responses (e.g., gender, age group, and usage frequency), while means and standard deviations were computed to determine the central tendency and variability of students' ratings for Moodle utilisation and the UTAUT dimensions. This approach provided an overview of the level of engagement with Moodle features and the extent to which students perceived the system as useful, easy to use, supported by the institution, and influenced by others. It should be noted that the analysis was limited to descriptive interpretation; therefore, no inferential tests (e.g., t-tests, ANOVA) or correlational or predictive analyses (e.g., correlation, regression, SEM) were conducted to examine relationships or test hypotheses.

Findings and Discussion

Reliability and Demographics

Cronbach's Alpha ($\alpha = 0.866$) indicated high internal consistency. Of the 164 respondents, 80.2% were female and 19.8% were male, mostly aged 18-24. Students showed moderate satisfaction with Moodle and regular use, with 63.4% using it daily or several times a week.

Descriptive Analysis of UTAUT Constructs

Descriptive results revealed that:

- **Effort Expectancy** and **Facilitating Conditions** received the highest mean scores, indicating that students found Moodle easy to use and that the institution provided strong institutional support.
- **Performance Expectancy** was also positively rated, reflecting students' belief that Moodle enhances learning (Raman & Rathakrishnan, 2018).
- **Social Influence** was moderate, suggesting that peer or instructor encouragement moderately affected their usage.

Utilization of Moodle Features

Table 2 below shows the level of students' utilization of Moodle Learning Management System features. The mean rating for Moodle Features is 3.61 out of 5.00, indicating that students used Moodle moderately.

Table 2: Utilization of Moodle Features

Features	Mean	N	Std. Deviation
Online Help	3.29	164	1.218
Glossary	3.33	164	1.244
Announcement	3.44	164	1.239
Online Test	3.46	164	1.265
Assignment	3.49	164	1.170
Course information	3.56	164	1.189
Quiz	3.59	164	1.150
Forum	3.71	164	1.176
Wiki	3.81	164	1.180
Survey	3.85	164	1.231
File	3.88	164	1.159
Chatroom	3.91	164	1.065
AVERAGE	**3.61**		

The most frequently used features were chatrooms, file uploads, and discussion forums, while quizzes and assignments were less utilized. The mean usage score across all features was 3.61, indicating moderate engagement (Romero & Ventura, 2024). Students valued Moodle for communication and access to resources more than for assessments.

Factors that contribute to the utilization of Moodle Learning Management System

Table 3 summarises the descriptive statistics for the four key constructs, based on responses from 164 participants. Overall, the mean values range from 3.65 to 3.76 on the measurement scale, indicating that respondents generally agreed with the statements representing each construct and reported favourable perceptions. Among the variables, Facilitating Conditions recorded the highest mean (M = 3.76, SD = 0.94), suggesting that most respondents perceived adequate supporting resources and enabling infrastructure (e.g., access to guidance, tools, or technical support) to use the system effectively. This is

followed by Effort Expectancy (M = 3.73, SD = 0.99), implying that respondents tended to view the system as relatively easy to learn and operate. Similarly, Performance Expectancy achieved a strong mean (M = 3.71, SD = 1.03), indicating that participants generally believed the system can enhance their performance and help them accomplish tasks more efficiently. Social Influence showed the lowest mean among the constructs (M = 3.65, SD = 0.90), suggesting that, while peer or institutional encouragement exists, respondents rely more on practical usefulness and enabling conditions than on social pressure when forming their perceptions.

In terms of dispersion, the standard deviations (0.90–1.03) reflect moderate variability in responses. Notably, Performance Expectancy has the highest variation (SD = 1.03), suggesting respondents differed more in how strongly they perceived performance benefits, whereas Social Influence shows relatively tighter agreement (SD = 0.90). Collectively, these results provide an initial indication that the sample demonstrates overall readiness and positive acceptance factors, particularly linked to perceived support and ease of use.

Table 3: Moodle Variables

VARIABLES	Mean	N	Std. Deviation
Social Influence	3.65	164	.90229
Performance Expectancy	3.71	164	1.02607
Effort Expectancy	3.73	164	.99307
Facilitating Conditions	3.76	164	.93515

Summary of Key Findings

This study examined students' utilisation of Moodle and the factors influencing its use using the UTAUT framework. Overall, the results indicate that students demonstrated **positive acceptance** of Moodle, with usage patterns shaped more strongly by **ease of use and institutional support** than by social pressure.

Reliability and Demographics

The measurement instrument demonstrated high internal consistency (Cronbach's Alpha = 0.866), confirming that the items reliably measured the intended constructs. The respondent profile (N = 164) was predominantly female (80.2%), with most students in the 18–24 age group, reflecting a typical undergraduate population. In terms of engagement, students reported moderate satisfaction with Moodle and regular system interaction, with 63.4% indicating that they used Moodle daily or several times per week. This pattern suggests that Moodle is embedded in students' learning routines, although the level of satisfaction indicates there is still room for improvement in user experience and instructional design.

Descriptive Analysis of UTAUT Constructs

Descriptive findings indicate that Effort Expectancy and Facilitating Conditions received the strongest agreement, suggesting that students generally perceived Moodle as easy to use and that the institution provided adequate support and infrastructure for effective access and learning. Performance Expectancy was also rated positively, implying that students believe Moodle contributes to their academic performance and learning effectiveness, consistent with prior findings that LMS usefulness can enhance learning outcomes (Raman & Rathakrishnan, 2018). In contrast, Social Influence was only moderate, suggesting that peers or instructors play a supportive, rather than dominant, role in motivating Moodle usage. This indicates that students' engagement appears to be driven more by practical considerations such as system usability, resource availability, and perceived learning benefits than by external encouragement.

Utilisation of Moodle Features

Students reported a moderate level of Moodle feature usage overall (Average Mean = 3.61/5.00), indicating that while Moodle is regularly accessed, its full range of tools is not maximised. The most frequently used features were chatrooms (M = 3.91), file access/uploads (M = 3.88), and surveys (M = 3.85), followed closely by wikis (M = 3.81) and forums (M = 3.71). This pattern highlights that students value Moodle mainly as a

platform for communication, collaboration, and access to learning materials. In comparison, features more directly related to assessment and structured learning activities such as quizzes (M = 3.59), assignments (M = 3.49), and online tests (M = 3.46)—were used less frequently. Consistent with Romero and Ventura (2024), this suggests that students may engage more readily with interactive communication and content-retrieval tools. In contrast, assessment-related features may require stronger instructional integration, more precise guidance, or improved design to increase adoption.

Factors Contributing to Moodle Utilisation

The descriptive statistics for the UTAUT constructs further reinforce the main drivers of Moodle use. Mean scores ranged from 3.65 to 3.76, indicating generally favourable perceptions. Facilitating Conditions recorded the highest mean (M = 3.76, SD = 0.94), confirming that students recognised the importance of institutional support such as system accessibility, guidance, and technical resources in enabling consistent Moodle use. Effort Expectancy was similarly high (M = 3.73, SD = 0.99), supporting the view that ease of use is a critical factor influencing adoption and continued engagement. Performance Expectancy also scored positively (M = 3.71, SD = 1.03), indicating that students largely perceive Moodle as beneficial to their learning and productivity. However, the slightly higher variability suggests differences in the extent to which individuals experience these learning benefits. Social Influence was the lowest (M = 3.65, SD = 0.90), reinforcing the earlier observation that Moodle utilisation is less dependent on external encouragement and more dependent on usability and enabling conditions.

Taken together, the findings suggest that a pragmatic acceptance pattern best explains Moodle utilisation in this context: students use Moodle regularly when the platform is easy to navigate and when strong support systems are in place, while deeper engagement with advanced learning and assessment features may require targeted pedagogical strategies, training, and course design improvements.

Implications and Conclusion

The findings suggest that sustainable digital learning depends on continuous institutional support, user-friendly interfaces, and awareness programs. Training sessions and active faculty involvement can enhance Moodle's role in promoting sustainable, technology-driven education (Dhawan, 2020; Korsah, 2024).

Future research can include regression or longitudinal analyses to explore the long-term impact of Moodle usage on academic performance and digital competence.

In conclusion, Moodle remains an essential tool in achieving sustainability in higher education by enabling flexible, accessible, and inclusive learning experiences. Its practical use can advance the goals of sustainable business education by integrating technology and pedagogy.

Implications for Sustainable Business Practices

The findings of this study extend beyond digital learning and offer valuable insights into sustainable business practices in both educational institutions and organizational settings. The integration of Learning Management Systems (LMS) such as Moodle not only supports pedagogical innovation but also demonstrates a model of sustainability-oriented digital transformation.

From a technological sustainability perspective, Moodle's open-source, modular architecture promotes cost efficiency, resource optimization, and long-term scalability—principles that closely align with sustainable digital infrastructure (Al-Fraihat et al., 2020; Moodle, 2018). Institutions that adopt open-source systems can minimize dependency on proprietary vendors, reduce licensing expenditures, and reinvest savings into capacity-building initiatives such as staff training and digital literacy enhancement. This mirrors sustainable operational models in business, where efficiency and reusability of technological resources underpin long-term value creation and environmental stewardship.

In terms of social sustainability, the findings on effort expectancy and facilitating conditions indicate that students perceive Moodle as an accessible and supportive tool, enabling equitable participation in digital learning (Raza et al., 2021). This inclusivity parallels sustainable business practices that emphasize employee empowerment, stakeholder engagement, and knowledge accessibility. In broader societal terms, inclusive access to digital tools advances the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 9 (Industry, Innovation, and Infrastructure), by ensuring that technology serves as an equalizing force rather than a divider (Redecker et al., 2020).

Furthermore, the study underscores the significance of institutional support and digital readiness, which resonates with sustainable leadership in organizations. Businesses that invest in supportive technological ecosystems through training, transparent communication, and participatory decision-making foster innovation, trust, and organizational resilience (Dhawan, 2020; Korsh, 2024). These principles reflect how sustainability in business increasingly depends on integrating human capital development with digital innovation and ethical governance.

From a pedagogical sustainability perspective, effective Moodle use encourages continuous learning, adaptability, and ethical awareness among students. Embedding such practices within business curricula cultivates a generation of professionals capable of applying sustainability-oriented thinking to real-world decision-making (Zhou & Liang, 2025). Consequently, sustainable business education becomes a catalyst for transforming economic and social systems toward more responsible, technology-enabled futures. In summary, the sustainable business implications emerging from this study include:

- Leveraging open-source technologies for cost-effective, scalable, and environmentally responsible innovation;
- Promoting inclusive digital participation to bridge educational and technological inequalities;
- Reinforcing institutional and organizational support as an anchor of sustainable leadership; and
- Embedding digital competence, ethical responsibility, and sustainability literacy into business education.

Through these actions, universities and business organizations can jointly contribute to creating a sustainable, digitally empowered, and socially responsible society, fulfilling the dual missions of academic advancement and corporate sustainability.

REFERENCES

Aldahwan, N. S., & Alsaeed, N. I. (2020). Use of artificial intelligence in Learning Management System (LMS): A systematic literature review. *International Journal of Computer Applications, 175*(13), 16–26. https://doi.org/10.5120/ijca2020920611

Al-Fraihat, D., Joy, M., Masa'deh, R., & Sinclair, J. (2020). Evaluating e-learning systems success: An empirical study. *Computers in Human Behavior, 102*, 67–86. https://doi.org/10.1016/j.chb.2019.08.004

Al-Naabi, I. (2023). Exploring Moodle usage in higher education in the post-pandemic era: An activity-theoretical investigation of systemic contradictions. *International Journal of Learning, Teaching and Educational Research, 22*(10), 190–208.

Ariffin, N. H., Alias, N. A., Rahman, H. A., & Sardi, J. (2014a). Assessment of the students' utilization of a learning management system in a Malaysian higher education. *2014 IEEE Conference on e-Learning, e-Management and e-Services (IC3e)*. https://doi.org/10.1109/ic3e.2014.7081235

Davidson-Shivers, G. V. (2018). *Web-Based Learning: Design, Implementation, and Evaluation*. Springer.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Korsh, D. P. (2024). Adoption and utilization of Moodle learning management system for emergency remote teaching: A UTAUT perspective. *Educational Point, 1*(2), e111. https://doi.org/10.71176/edup/15730

Moodle Definition. (2018, March 3). *TechTerms*. https://techterms.com/definition/moodle

Olushola, T., & Abiola, J. O. (2017). The efficacy of technology acceptance model: A review of applicable theoretical models in information technology researches. *Journal of Internet Banking and Commerce, 22*(2), 1–18.

Raman, A., & Rathakrishnan, M. (2018). Students' readiness and acceptance of e-learning technologies in Malaysian higher education. *Asian Journal of University Education, 14*(1), 1–10.

Raza, S. A., Qazi, W., Khan, K. A., & Salam, J. (2021). Social isolation and acceptance of the learning management system (LMS) in the time of COVID-19 pandemic: An expansion of the UTAUT model. *Journal of Educational Computing Research, 59*(2), 183–208. https://doi.org/10.1177/0735633120960421

Redecker, C., Punie, Y., & European Commission. (2020). *Digital Competence Framework for Educators: DigCompEdu*. Publications Office of the European Union.

Romero, C., & Ventura, S. (2024). Educational data mining and learning analytics: An updated survey. *ACM Computing Surveys*. https://arxiv.org/abs/2402.07956

Sánchez, A., Peñarreta, J., & Soria, F. (2024). Learning management systems for higher education: A brief comparison. ResearchGate Preprint. https://www.researchgate.net/publication/372261912_Learning_Management_Systems_for_Higher_Educatio

Susana, S., & Nurdyansyah, N. (2023). Use of a learning management system for students' independence and discipline. https://doi.org/10.21070/ups.455

Valcheva, D., & Todorov, M. (2012). Methods and tools for increasing the effectiveness of e-learning. In *Methodologies, Tools and New Developments for E-Learning*. InTech. https://doi.org/10.5772/28615

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

Zhou, Y., & Liang, J. (2025). Integrating learning analytics with UTAUT for LMS adoption research. *Journal of Educational Technology and Society, 28*(1), 45–60.

CITATION

Al-Dhahaba, I., S., A., Al-Balushib, M., A., M., & Al-Maashanic, M., M., I. (2026). Enhancing Sustainable Digital Learning Practices in Higher Education: A Descriptive Analysis of Moodle Adoption Using the UTAUT Framework. *Sohar University Journal of Sustainable Business*, *2*(1). 102-117.