Hindawi
Advances in Human-Computer Interaction
Volume 2023, Article ID 6659245, 11 pages
https://doi.org/10.1155/2023/6659245

Research Article

Learning Experience of Students Using the Learning Management System: User's Perspective on the Use of Moodle in the University of Jordan

Ahmad Althunibat,[1] **Wael Alzyadat**,[1] **Ibrahim Almarashdeh**,[2] **Mutasem Alsmadi**,[2] **Aoun Othman Al Shawabkeh**,[1] **Anmar Abuhamdah**,[3] **and Malek Alzaqebah**[2]

[1]*Department of Software Engineering, Faculty of Science and Information Technology, Al-Zaytoonah University of Jordan, Amman, Jordan*
[2]*College of Applied Studies and Community Service, Imam Abdurrahman Bin Faisal University, Al-Dammam, Saudi Arabia*
[3]*Department of Management Information Systems, College of Business Administration, Taibah University, Madina, Saudi Arabia*

Correspondence should be addressed to Ahmad Althunibat; a.thunibat@zuj.edu.jo

Received 23 December 2022; Revised 4 July 2023; Accepted 22 December 2023; Published 31 December 2023

Academic Editor: Francesco Bellotti

This study aimed to evaluate the effectiveness of Moodle LMS as an alternative delivery mode for education, particularly in the higher education system of Jordan, which has not been evaluated before. The research is based on Moore's transactional distance learning theory, which considers interactions among students, instructors, and course material, as well as personal characteristics of students. The study included 50 participants who have taken courses on Moodle LMS at the University of Jordan. Both interviews and research surveys were conducted to gather in-depth perceptions and analysis of the participants' experiences with Moodle LMS. The findings suggest that Moodle LMS was an effective alternative study tool during the COVID-19 pandemic and the user-friendly course design enhanced the user experience of using Moodle LMS. Participants also provided suggestions to optimize the system for better integration in the University of Jordan. Fixing Moodle LMS based on the recommendations of the study participants will significantly improve the learning experience of students. This study contributes to the advancement of the state of the art by evaluating the effectiveness of Moodle LMS in the higher education system of Jordan and providing recommendations for improvement.

1. Introduction

The second decade of the 21st century saw the outbreak of the COVID-19 pandemic in Wuhan, China. This pandemic severely disturbed all forms of activity and killed millions of people around the world. The education system is also not immune from the adverse consequences of the pandemic. Resultantly, face-to-face learning was discontinued and billions of students were affected [1, 2]. However, higher education institutes around the world have been already operating effective E-learning systems [3, 4]. Meanwhile, in Jordan, the ministry of education ordered to close the educational institutions around the country to curb the spread of contagion. Global analysis revealed that the teachers and students were comfortable shifting to online education owing to lockdown and COVID-19-related university closures. The professors and teaching faculty of renowned universities gained online instructor certification to deliver online classes to the students with ease. Simultaneously, both the faculty members and staff arranged online webinars to learn about online platforms for the delivery of education. The traditional style of face-to-face teaching became obsolete during the COVID-19 pandemic. However, there are concerns about the quality of online education [5, 6].

Learning management systems (LMSs) often called the "content management system" (CMS) or the virtual learning environment (VLE) have the fundamental purpose of keeping the student records and instructing them in regards to learning and assessment as well. In many recent reports, e-learning platforms in the education sector such as Moodle, Blackboard, and Desire2Learn were mentioned as the biggest LMS vendors [7]. Moodle is a widely known free and open-source LMS that performs the task of e-learning to different communities worldwide. It was first released in 2002, on August 20th, and Martin Dougiamas was its developer [8]. In Jordan, the government has also shown interest in adopting e-learning to cope with the modern needs of educational institutions. It formulated a vision, enhancing the quality of education and inspiring lifelong learning through E-learning. In line with this vision, the University of Jordan developed the Blackboard system in 2005 as an E-learning management system [9]. Later on, this system was replaced with open source Moodle.

The inability of Jordan's education sector to ensure the accessibility of good education to students through e-learning platforms such as Moodle is the main problem faced in this research. So, the need is for better management and improvement of the already available e-learning platforms in Jordan, especially in their higher education field. The aim, therefore, can be the easy accessibility and good working of these platforms so that they ensure good quality education in difficult times and remote locations. This research is going to address the following research questions:

(1) What is the experience of students using Moodle as a learning management system (LMS) at the University of Jordan?

(2) How can higher education institutions enhance the usability and accessibility of LMS "Moodle"?

(3) What is the effectiveness of LMS "Moodle" during uncertain conditions such as the COVID-19 pandemic?

(4) What are the barriers to the adoption of LMS "Moodle" at the University of Jordan?

This paper aims to study the user's experience of Moodle, a modular object-oriented dynamic learning environment, to understand its effectiveness in delivering e-learning courses. Despite the widespread use of the term user's experience, there is little consensus on its definition, making it challenging for industry practitioners to define the user's experience. The paper, therefore, aims to provide a better understanding of user's experience by reviewing relevant literature and proposing a model to measure user's experience. The paper's primary contribution is to identify the key determinants of user experience of Moodle and suggest measures to improve it.

The importance of this work lies in the fact that the COVID-19 pandemic has brought online learning to the forefront of education and there is a need to assess the effectiveness of online learning platforms. Moodle is one of the most widely deployed platforms for delivering online education, and this study's findings can be useful in improving the platform's effectiveness in delivering e-learning courses. In addition, the proposed model can be used to measure user's experience in other e-learning systems, helping to improve the overall quality of online education.

In the rest of this paper, we demonstrate a part of the literature review in Section 2. Section 3 shows the proposed framework. Section 4 discusses the research methodology, and the results and discussions are presented in Section 5. Section 6 concludes this study.

2. Literature Review

2.1. Higher Education in Jordan. Despite limited resources, Jordan has gained a strong reputation in education within the MENA region. The country is home to 84 higher education institutes, including 10 public and 24 private universities, as well as around 50 community colleges [10]. Jordanian universities offer diverse programs in natural and applied sciences, pharmacy, humanities, arts, engineering, and more. The Ministry of Higher Education and Scientific Research regulates these institutions, with the Higher Education Accreditation Commission (HEAC) ensuring educational standards [11]. Jordan was the first country in the region to introduce Information and Communication Technology (ICT) in educational institutes, with ICT service providers offering technical assistance and training to enhance education quality [11].

2.2. Overview of Online Learning in Jordan. In the 2000s, online learning adoption in the MENA region was slow compared to developed countries, primarily due to cautious approaches and limited internet access [12, 13]. However, Jordanian universities began integrating learning management systems (LMSs) such as Moodle and Blackboard in 2010 [14]. Researchers emphasized the need for further integration of e-learning into teaching and learning processes in Jordan [9]. However, Jordan's regulations limited online learning to a maximum of 25% of overall education [15]. Despite challenges with hardware and computer skills, students showed eagerness to learn through e-learning platforms [9, 16, 17]. To fully enable e-learning, technical training and infrastructure support were identified as essential [12]. Studies in the MENA region, including Lebanon and Iran, have used the technology acceptance model (TAM) to assess factors influencing e-learning adoption [18, 19].

In their article "Challenges of E-Learning System Adoption in Jordan Higher Education" [20], the authors analyzed the difficulties faced by educational institutions in transitioning to e-learning and offer suggestions for overcoming challenges (2019). Another article, "E-Learning for Extraordinary Times" by [21], explores the transformation of Jordanian universities during the pandemic and evaluates the quality and accessibility of education provided through e-learning platforms (2020).

2.3. COVID-19 Disrupted the Education System. The COVID-19 pandemic posed unprecedented challenges to the education sector worldwide, affecting students, faculty, staff, and families. School administrators faced difficulties in supporting frustrated and uncertain faculty members, leading to the importance of self-care and creativity in distance teaching [22, 23]. Students also experienced well-being issues due to extended screen time, limited physical activity, and an unhealthy diet. Psychological impacts, including frustration, fear, and boredom, were observed during quarantine [24, 25]. In addition, the pandemic worsened social problems such as food insecurity and limited internet access, leading to educational disparities and increased learning loss [24, 26]. The quality of teaching was influenced by teachers providing emotional support and stability to students during this challenging time [27]. Numerous articles proposed solutions to minimize inequalities and ensure academic progress in e-learning during the pandemic [24, 28].

2.4. Learning Management Systems: Alternative to Traditional Classrooms. Various terms are used interchangeably to define the learning management systems, including the course management system (CMS), learning content management system (LCM), virtual learning environment (VLE), virtual learning system (VLS), or e-learning portals. All these terms differ slightly in their interpretation [29]. In the current research, the learning management system (LMS) is used for the e-learning systems. According to a researcher, modern LMS is a system that is developed and integrated into various applications to assist the delivery, administration, and assessment of learning courses in blended, face-to-face, or e-learning environments [30].

The rationale to integrate the learning management system in an organization depends on the objectives to be achieved. The most common objective of integrating the LMS tool is to enable remote access to the learning courses for both the learners and instructors [30, 31]. Furthermore, it is pertinent to note that the learning management system is flexible and it can be modified according to the objectives of an organization. For instance, it can be modified into a gamification instrument, social learning, and an integrated communication system for learners and instructors. Besides, it plays a vital role for educational institutions from the business point of view by enabling the users to manage the learning content and communicate with others in real time. Furthermore, modern LMS also enable the learners to track their progress in different courses by creating a virtual learning environment.

Learning management systems can fulfil various purposes such as in the educational institutions, these systems help in effective planning, implementation, and management of courses as well as they also help in assessing the learning activities of the students. The principal function of LMS in educational institutions is to centralize the learning activities by organizing courses and content from different resources into one place. Besides, LMS also helps in tracking students' achievement in the form of group discussions on discussion boards and assessment of examinations [29, 32]. In the educational institutions, learning management systems have simplified various functionalities of e-learning. The recent boom in the LMS in the market and its diverse functionalities have compelled organizations to integrate LMS to assist students in e-learning. However, the competitive nature of LMS in the markets and the need for complex system management have made the process of choosing the most suitable LMS for an organization a daunting task. Therefore, educational institutes must make informed decisions about the LMS system that is financially viable and requires minimum technical support.

Multiple factors must be considered before opting for a learning management system. These factors include the LMS type, licensing, pricing, copyright, updates, application integration, security, and usability [30, 33]. One researcher identified two important types of the learning management system which include the deployment type LMS and the licensing type LMS. The deployment type LMS is deployed in-house and managed within the organization, while licensing LMS is controlled by third parties through cloud-based services. In the licensing of LMS systems, two major types emerge including proprietary learning management systems and open source. In the proprietary learning management systems, there is a high standard of legal rights which enables a large number of users to utilize the platform, and this platform is only visible to limited locations and not open to public owing to security reasons. It is also called a closed-source LMS with limited integration [30]. However, open-source LMS is offered as a product for the general public and it is licensed under General Public License (GPL) terms. Thus, in this, LMS users enjoy the freedom of changing the system according to their requirements [30].

One of the most important factors that determines the choice of LMS is price. Three types of software delivery types are the critical deciding factor for the price of LMS. These three types include open source, premium, and freemium. In the premium package, a fully designed copy of the learning management system is provided to the buyer which also includes add-ons applications which is missing from open source LMS. In the premium type, there is a need for upfront payment to access various products and services of LMS. The ideal type of LMS is based on the freemium package which can be accessed freely by the users. However, some limitations are there which limit the usability of the LMS and the users have to pay to third party to use restricted features. The third type of LMS is based on the open-source package which is free for users. The organizations can opt for various added services by paying minimal fees which ultimately improve the efficiency of LMS. In this type, the users are free to make customizations in the LMS based on their individual needs.

3. Theoretical Framework

The theoretical framework for this study is based on Moore's transactional distance theory, which provides a foundation for understanding the interactions and determinants that influence the learning experience in distance learning.

According to Moore [34], distance learning involves four key variables; the interaction of students with the faculty, content, other students, and the character of the student.

Moore's theory recognizes that distance learning is a dynamic process that differs from traditional face-to-face education in classrooms. The theory emphasizes the importance of interactions in shaping the instructional and learning behavior of students. It highlights the significance of the student-instructor interaction as the most crucial element in distance learning, influenced by factors such as personality, educational philosophy, environment, and course material.

One-way communication in distance education creates a transactional distance, which hinders effective learning. Therefore, reducing the transactional distance becomes essential for optimizing the learning process. Other researchers have also identified the student-instructor interaction as a vital factor that influences the learning experience in e-learning environments.

The course content is another determinant of the learning experience. The structure of the course content affects communication and can either facilitate or hinder effective dialogue between instructors and students. A highly structured course content can create barriers and limit instructors' ability to respond to student queries, negatively impacting the learning experience.

Interaction among students is also an important aspect of e-learning. Electronic tools such as Skype, Facebook, email, and discussion boards enable interaction and collaboration among students, enhancing the overall learning experience.

Finally, the student's personality plays a significant role. Learners who are autonomous and motivated and have a desire to learn tend to have a better learning experience compared to those with limited motivation.

By adopting Moore's transactional distance theory, this study aims to investigate the interactions and determinants that affect the learning experience of students using Moodle as a learning management system. The theoretical framework provides a comprehensive lens to analyze the transactional distance and its impact on the effectiveness of e-learning in the context of the University of Jordan (see Figure 1).

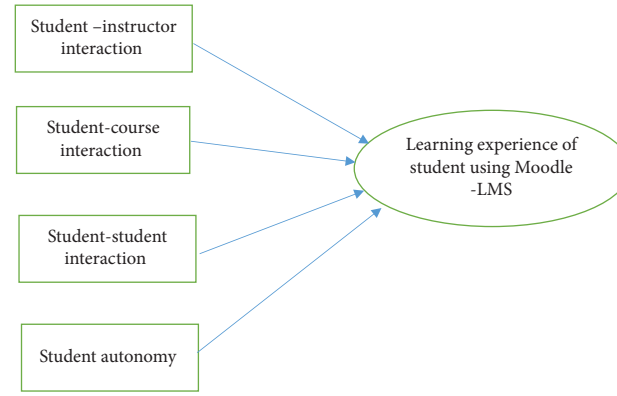

Figure 1: Theoretical framework (adopted form Moore's transactional distance theory).

4. Methodology

In this section, the details of the methodology adopted to conduct this study to evaluate the experience of students using Moodle LMS at the University of Jordan are given. In this section, there is a detailed discussion of the research design, study participants, data collection, and data analysis.

4.1. Research Instrument. Most of the previously conducted studies have focused on enhancing the number of enrolled students in online courses without paying necessary attention to the learning environment [35, 36]. Another researcher emphasized the need to conduct a study to analyze the influence of the environment on the learning experiences of students [37]. Therefore, the current study was conducted to determine the factors that influence the user's experience of using Moodle LMS, an online system for better delivery of online classes. The study was conducted to assess four research questions which were provided in the first section and to answer these four questions, 10 interview questions, as well as 11 quantitative question based on the Likert scale, were developed.

4.2. Study Participants. The population for this study is all students who have been enrolled on an e-learning course through Moodle LMS at the University of Jordan. The sampling technique adopted for this study is nonprobabilistic, as participants would be selected based on their availability and willingness to participate in the study. The sample size of 50 participants is appropriate as it is a reasonable number to gather in-depth perceptions and analysis of the participants' experiences with Moodle LMS. In addition, the sample size is appropriate as it falls within the recommended range for qualitative research studies. The sample size also allows for a diverse range of perspectives from the participants.

The chosen sampling technique is appropriate as it allows the researcher to select participants who have experience with the Moodle LMS system. Moreover, nonprobabilistic sampling is useful when the research is focused on exploring in-depth perceptions and analysis of a particular phenomenon. In this case, the nonprobabilistic sampling technique would allow for a more in-depth analysis of the participants' experiences with Moodle LMS.

To ensure ethical considerations, all the participants would be informed of the study's objectives and an informed consent form would be signed by each participant. The informed consent form would explain the purpose of the study, the data collection procedures, and the protection of confidentiality.

4.3. Data Collection Methods. The data collection is important to ensure that reliable data are collected. This study had a mixed-method design including both the qualitative and quantitative parts. In this study, an interview method is prepared which contained questions about the experiences

of the study participants who have used the e-learning system at the University of Jordan. The interviews would be conducted on the campus and all the interviews would be recorded. The interviews would be transcribed and further analyzed to identify the underlying experiences of the study participants with the learning management system. Furthermore, the participants would be asked to reflect on their personal experiences with the LMS Moodle to further improve and enhance the functionality of the online learning system. Besides that, quantitative data were also collected with the help of a research questionnaire. All the participants who took part in the interview were also provided with a research questionnaire that had questions with Likert-type responses. The participants filled out that questionnaire and handed them over to the interviewer. All the 50 participants included in this study gave the interviews which were recorded and some field notes were also taken to analyze the responses based on the nonverbal expressions of the participants. Moreover, a completed research questionnaire from each participant was also collected at the end of the interview.

4.4. Data Analysis. The objective of this study was to analyze the learning experience of the students using Moodle LMS. The recorded interviews were transcribed with the help of speech recognition software. In this way, the recordings were converted into text. These data were saved on a laptop and a copy of each transcription was sent to the respective participants to validate the authenticity of their responses. All the approved transcripts were stored and the data were organized based on the themes generated from the transactional distance theory as well as the theme outlined in the research objectives. Moreover, for the survey questionnaire, the data are entered into SPSS version 21. The responses were analyzed and a frequency distribution chart is generated. These data helped in quantifying the experience and enabled us to compare it with the emerging themes from the qualitative interviews.

Triangulation of data was performed to ensure no conflicting information in the data. Triangulation was done by cross-checking the data with the field notes and coded transcripts. Moreover, triangulation was also done from multiple sources which strengthened the validity of the research results. One researcher also stated that it was important to perform member checking of data by sending it to the participants [38]. Therefore, the transcripts and main results of the analysis were sent to the study participants. In this way, the data were triangulated.

5. Results and Discussion

This study was aimed at evaluating the experience of the students using Moodle LMS at the University of Jordan, Jordan. Moore's transactional distance theory is utilized in this research as a theoretical framework to understand the four different interactions that shape the user's experience of Moodle. These include the interaction of students with the content available on Moodle, faculty, other students, and characters. The objective of this study was to explore the underlying perceptions and experiences of the students using Moodle and use these findings to help the administration of the University of Jordan and faculty members to further improve Moodle and ensure quality e-learning opportunities for all. In this research, Moore's transactional distance theory helped create the conceptual framework to study the perception of students about Moodle LMS.

In this section, the results of the interview in the form of emerging themes, their interpretation, and implications for Moodle LMS at the University of Jordan are discussed. The main objective of this study was to investigate the learning experience of students using Moodle LMS at the University of Jordan. The interaction factors outlined by Moore guided the learning experiences of the students. The findings revealed that the learning experience of students using Moodle LMS is significantly influenced by the student-course content interaction. These results are in consonance with a previous study that reported that students have a better experience of e-learning when the course content is user friendly [39]. It also highlights the construct of ease of use which shows the usability of the Moodle. Furthermore, another study confirmed these findings in which students who reported success in e-learning were those who could clearly understand the course content [40]. It was further reported that the students who accessed various sources at higher rates had better grades than the students who accessed limited resources. In the current study, the access rate is linked with the interaction of students with the course content available on Moodle LMS.

In the current study, the second important determinant of students' experience was found to be student-instructor interaction. The participants reported having benefited from the feedback of instructors. However, some participants were not happy with the delayed feedback of the instructors. These findings of the current study oppose the findings of a previous study in which student-instructor interaction was reported to be the major determinant of students' positive experience in e-learning [41]. The lowest rated factor that influences the student's experience of using Moodle LMS for e-learning was student-student interaction. However, the fourth determinant which was identified by Moore was that the student character has been rated superior to student-student interaction.

In the interview, the students emphasized the student content as the major influence on their experience of Moodle LMS at the University of Jordan. All the included participants reported that they tend to interact with the course content on Moodle and give less attention to other students. For instance, one participant said

> *"I don't find my peers as having more knowledge about the course and Moodle has a very good feature of a discussion board in every course which allows me to interact with my peers about the course content. If I came across a problem*

related to the course, I don't rush to the discussion board to talk to my peers instead I contact my instructor who provides me with valuable suggestions. Therefore, the best part of Moodle LMS is that it allows student-content interaction."

Another participant stated that

"In my opinion, students don't bother each other and therefore there is no need to interact with other students who are outside my course content. I don't prefer Moodle LMS for socializing with my peers. For that, I prefer traditional classrooms. The most preferred choice that intrigued me to use Moodle LMS is my interaction with the course content available here."

Sentiments of the participants reflected the opinion of all the included participants:

"The main factor that motivated me to join Moodle LMS was the luxury to access courses while sitting on the couch of my home. Furthermore, the COVID-19 pandemic also made it difficult for me to take traditional classrooms, like many other students due to lockdowns and closures. Another important factor was that Moodle LMS allows us to pay a minimal subscription fee which is less than that of fees that we have to pay for on-campus classes. I can post any query in the discussion panel of my course which allows my instructors and peers to help me whenever I need it. Moreover, the option to submit my papers directly is also a plus point. For me, the real game-changer is the option to stay connected with the course content and I can easily retrieve all the relevant course readings from Moodle LMS. This system also provides external links to find the most relevant information and therefore I don't need the help of my peers related to my course work."

Mason & Rennie (2010)also reported that the quality of the content available in online portals is more valuable for the students as compared to the interaction with peers [42]. In another previous study, similar findings have reported that student-content interaction is a more satisfactory element of online learning as compared to interaction with peers and faculty members [43]. It was also reported that students spend more time interacting and researching course materials on e-learning portals than interacting with peers. Therefore, it can be assumed that the quality of the course content and the ease of using that content are motivating factors for the students to use Moodle LMS [44]. Furthermore, it also optimizes the experience of students using learning management systems [45, 46].

The participants in this study reported that successful utilization of Moodle LMS requires the students to have a basic knowledge of using computers. Besides that, some other qualities identified by the participants as important to successfully using Moodle LMS for learning purposes are the perseverance and the capability of students to search for different course-related material from the portal. Participants' responses are given in the following:

"The students using Moodle LMS will have a better experience of online courses if they are resourceful and understand the basics of computer and learning management portals."

Another participant stated that computer literacy and awareness of online technology are vital to easily using Moodle LMS.

"I enrolled in a course on Moodle LMS without having comprehensive knowledge of the portal, however, I believe I have enough skills to harness this portal. I have taken computer courses which made me realize that using online portals such as Moodle LMS is more convenient and flexible to uptake courses as compared to traditional classrooms. It gives me freedom of time as well as choices regarding the courses that I wish to be enrolled in. I think the best thing about Moodle LMS is that it enables the users to navigate complex issues with ease and facilitates the students to complete their assignments on time. The built-in reminder notification system in Moodle LMS never let me miss my schedule."

These findings reflect the need for basic computer skills to smoothly utilize Moodle LMS and have a good learning experience at the University of Jordan. When the participants were asked about their experience of using Moodle LMS during uncertain times of COVID-19, the participants responded as given in the following:

"COVID-19 emerged as an emergency and it is something that scared me. It disrupted every aspect of life. I worried about my studies, I had no idea how would this pandemic come to an end. The lockdowns and closures of life made me scared. However, the university administration did a fairly good job by announcing the utilisation of Moodle LMS as a medium to deliver education. I enjoyed being enrolled in courses on Moodle LMS and despite the scary times, I utilized sessions on Moodle to learn more about research. So, overall my experience of using Moodle LMS was good. I faced difficulty grasping the concepts during online lectures on Moodle LMS. The participant stated that I had little to no knowledge of working with data management sessions. I am not sure if I will get the recap of the learned material when on-campus classes will resume. I don't think the online mode of teaching through Moodle LMS is appropriate for technical courses."

Still many of the included participants were overwhelmed with the utilization of Moodle LMS as it prevented the loss of education.

"I am grateful that Moodle LMS is available as it helps me to revise my lecture and use it for future use. Furthermore, the material available on Moodle LMS is adequate and the reference materials are also sufficient. I am happy with virtual classes as it allows better communication between instructors and students."

Some participants also reported facing issues which need to be fixed to widen the applicability of Moodle LMS. Some of the issues reported by the participants are given in the following:

"In my last exam, I faced technical issues and the Moodle LMS malfunctioned. Therefore, I could only complete 20 questions out of 30 which is not a good thing. The administration needs to address malfunctioning issues and regularly monitor the system for any viruses or bugs. One of the good things about Moodle LMS was that it provided access to the notes in the form of PowerPoint. However, whenever I try to download the presentations the system gave me an error and therefore I could not retrieve the presentation notes. Furthermore, once the notes are seen the first time, they disappear the next day which is kinda makes a problem. Therefore, the administration must fix this issue and ensure the availability of course material to all the students."

5.1. Interpretation of Results. This design of this study was to evaluate the learning experience of the students using Moodle LMS at the University of Jordan. Based on Moore's transactional theory, the participants responded to the questions that determine the importance and influence of four different interaction factors including interactions with other students, course content, instructors, and student character. There were 10 questions in the interview. However, during the course of interviews, additional questions also came to the fore which were addressed subsequently to understand the learning experience of the users on Moodle LMS. Participants provided their rationale for taking up e-learning courses on Moodle LMS.

5.2. Demographic Statistics. The quantitative analysis begins with the demographic information of the study participants. It was found that 76% of the study participants belonged to the 18–28 years age group and 84% of the participants were male. Moreover, 62% of the participants had taken 6 units of courses through Moodle LMS and 26% had taken 12 units of courses while 12% had 18 units of courses through Moodle LMS.

5.3. Time Spent on Moodle LMS. In the quantitative part of the research, the study participants were asked about their time spent on Moodle LMS. The responses of all the participants are provided in Table 1.

Table 1 shows different activities in which study participants spend their time on Moodle LMS. It can be seen that the majority of the participants spend most of their time completing their assignments and accessing course material. During the interview, it became apparent that the participants use Moodle LMS for reading the course content and completing their assignments. Analysis of data from the quantitative survey reveals that 44% of the students reported spending 14 hours per week reading course material on Moodle LMS, while 20% reported spending 20 hours per week reading the course material. 72% of the participants reported spending only 2 hours per week interacting with peers on Moodle. Likewise, 48% of the participants reported having spent 4 hours per week interacting with instructors. 32% of the participants have spent 4 hours per week taking online quizzes on Moodle LMS. However, 64% of the participants reported having spent 14 hours per week completing their course assignments.

The participants of the study were asked if they are comfortable using Moodle LMS for their e-learning classes. 90% of the participants reported having a comfortable experience using Moodle LMS. One of the participants in the interview also stated that "I was not sure about using Moodle LMS initially owing to my lack of confidence to deal with the complex interface of Moodle. However, when I started taking my course units my perceptions started to change and now I enjoy taking courses on Moodle LMS. I am comfortable using Moodle LMS and I intend to take further courses on Moodle LMS" (see Figure 2).

In this study, thirty-two participants (64%) agree that they have spent an adequate amount of time on Moodle LMS for e-classes. Nineteen participants (38%) agreed that they feel comfortable using a computer to access Moodle for an online course. Twenty-seven participants (54%) agreed that they have an exceptional experience using online courses through Moodle LMS. Twenty-four participants (48%) strongly agreed that Moodle LMS has successfully met their expectations of delivering online courses. Eighteen participants (36%) agreed that the interface of Moodle LMS is user friendly and they enjoy using Moodle. Twenty participants each agreed and strongly agreed (a total of 80%) that the available methods of online course delivery on Moodle LMS are satisfactory and met their expectations. Twenty-one participants (42%) strongly agreed that they can easily access online course discussions on Moodle LMS. Twenty-two participants (44%) believed that the level of student-student interaction available on Moodle LMS has met their expectations. Twenty-three participants (46%) also strongly agreed that student-instructor interaction has been good on Moodle LMS. Likewise, twenty-six participants (52%) strongly agreed that the student-course interactions had also met their expectations. One important question is that if Moodle LMS has been effective during COVID-19, sixteen participants (32%) agreed with the statement and 22% disagreed with the statement.

5.4. Implications for Moodle LMS at the University of Jordan. The findings of this study have several practical and theoretical implications. First, the study can guide the instructors and administrators of the University of Jordan to better understand the learning experiences of students using Moodle LMS. Based on the findings, instructors can enhance the usability of Moodle LMS by providing easy access to course material and integrating group video conferencing for better communication. Second, the study can guide the developers of Moodle LMS to improve the user interface and functionality of the system. The study recommends the inclusion of more course-related study material and providing regular feedback to students to optimize the functioning of Moodle LMS.

Table 1: Hours spent per week on Moodle LMS ($N = 50$).

Hours per week	Reading course material	Interacting with peers	Interacting with instructors	Taking online quizzes	Completing assignments
2	—	36	8	14	—
4	—	6	24	16	—
6	—	2	—	4	—
8	—	2	12	2	—
10	—	4	—	14	—
12	11	—	4	—	—
14	22	—	—	—	32
16	5	—	2	—	14
18	2	—	—	—	—
20	10	—	—	—	4

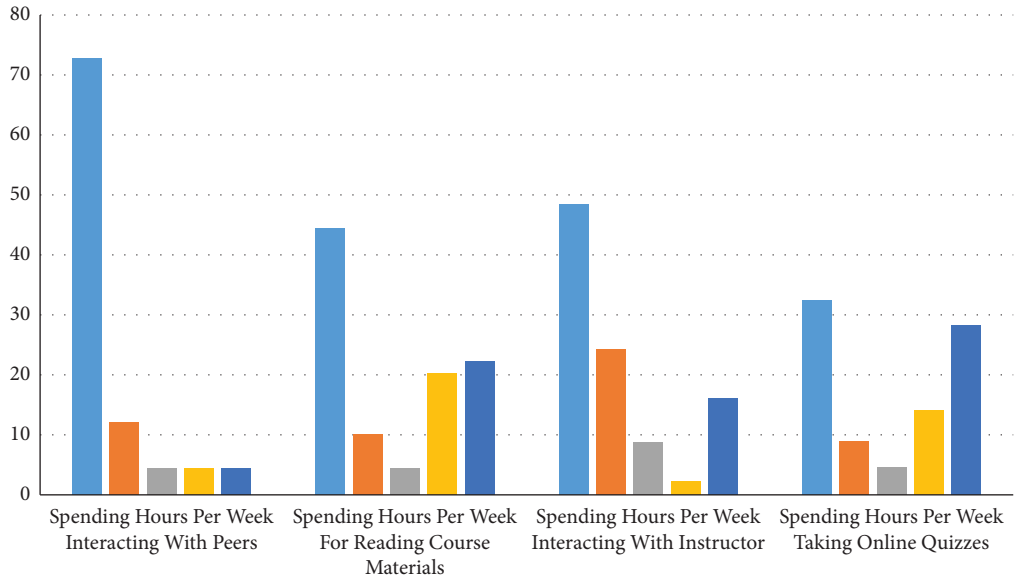

Figure 2: Hours spent per week on Moodle LMS.

The study has theoretical implications as well. The findings support previous research that emphasizes the importance of the user interface, course content, and communication in online learning environments. The study also confirms that the interaction between learners and the course material is crucial for determining the successful usage of the e-learning portal by the students. In addition, the study reveals that social influence has an impact on the acceptance of the system which ultimately describes the user's experience.

Furthermore, the study highlights the importance of Moodle LMS during the COVID-19 pandemic, as it has successfully delivered knowledge to students during the unprecedented crisis. This finding is significant as it can guide educational institutions worldwide to implement e-learning platforms to ensure continuity of education during such unforeseen circumstances.

In summary, the findings of this study can guide instructors, administrators, and developers of Moodle LMS to improve the user's experience of students. The study also contributes to the theoretical understanding of online learning environments by confirming the importance of the user interface, course content, communication, and social influence. Lastly, the study emphasizes the importance of e-learning platforms like Moodle LMS during crises like the COVID-19 pandemic to ensure continuity of education.

6. Conclusion

Most of the previous studies have investigated the interaction of students with various components of e-learning courses. However, these studies have not investigated the user's experience of Moodle LMS. Moreover, there is a dearth of empirical research on the user experience of Moodle LMS. This research is an attempt to evaluate the perceptions and experiences of the students using Moodle LMS based on the interaction factors noted by Moore in his transactional distance theory.

One of the major benefits of e-learning is that it allows the students to access any course from the comfort of the couch in their homes. In this research, 54% of the participants reported having an exceptional experience using online courses through Moodle LMS. According to one participant, "*Moodle LMS has been a lifesaver for dedicated*

learners. During the COVID-19 crisis, Moodle LMS emerged as a ray of hope and enabled us to continue the journey of education." It shows that students have enjoyed taking classes on Moodle LMS. The majority of the study participants (53%) reported that their interaction with a course on Moodle LMS has been good and met their expectations. In the words of one participant, *"the course material is designed properly with the objectives, of course, due dates, assignments, quizzes and expected outcomes from the students."* Another participant stated that *"I was skeptical about the course material on Moodle LMS, but once I begin the course my concerns fade away and I enjoyed the course."*

Most of the participants were of the view that they had enjoyed the interaction with the course content available on Moodle LMS which had been the major factor that shaped their learning experience on Moodle LMS. Furthermore, the participants stated that the courses were easily accessible with the user-friendly interface of Moodle LMS which motivated them to continue taking courses on Moodle LMS. This aligns with a previous study which argued that there is a need for built-in motivational factors in online courses to keep students fascinated with online learning. Therefore, the University of Jordan must accentuate the need to design Moodle LMS in a way that motivates the students.

The second most important interaction reported in the current study was that of student-instructor as 46% of the participants reported that their level of interaction with instructors met their expectations on Moodle LMS. Several participants reported that there is a need to improve the feedback time which will further enhance their experience of online courses on Moodle LMS. One participant suggested that *"University administration must arrange online professional training programs for all the instructors to enable them to deliver online courses with the most updated pedagogical techniques."*

The results of this research highlight the crucial role of course design, instructor-student interaction, and peer-to-peer collaboration in fostering a positive learning experience on Moodle LMS. The study contributes to the existing body of knowledge by shedding light on these key determinants of user's satisfaction with the platform.

However, the study also identifies the need for further research on the technical requirements of Moodle LMS to fully understand its usability and ensure that students are able to easily navigate and use the portal. Future studies should address the limitations identified in this research and build upon its findings to enhance the user experience of Moodle LMS.

Overall, this research underscores the importance of considering both the technical and human aspects of e-learning platforms to create a truly effective and satisfying learning experience for students. By continuing to explore and improve upon the factors identified in this study, we can work towards creating more user friendly and engaging online learning environment.

6.1. Strengths and Limitations. Limitations often compromise the results of any research study. This research is also not concealed from limitations and one major limitation of this mixed-method study is that the information provided by the participants in the interview could be ambiguous. We tried to minimize biased views by bracketing the responses. Bracketing is a process that helps a researcher to eliminate bias and preconceived notions about an area of interest which has the potential to distort the data collection and analysis. One another way of minimizing bias in research is to perform assess the reliability of the research methods. In this research, the reliability is ensured by note taking and sending the transcribed interviews to the participants for cross-verification as well as triangulation of data. Despite this measure, the study has some limitations. For instance, the sample size of 50 participants was small. I tried to recruit a large sample size, but various technical issues and the unavailability of students who participated in Moodle LMS courses made it difficult to recruit a large number of participants. One advantage of 50 participants was that the research is completed in a short time as it requires a large amount of time to conduct interviews and surveys. Furthermore, there was no statistical test performed in this study and, therefore, the sample size met the research requirements. I asked my friends to serve as independent reviewers and scrutinize the data. The research questionnaire for this study and the interview questions adequately addressed the research questions.

6.2. Recommendations for the University of Jordan. It is evident from the research findings that the students preferred interaction with the course material available on Moodle LMS. The university needs to review the role of instructors on Moodle LMS to improve the experience of students. There is a need for timely feedback to ensure that students are satisfied with the usability of Moodle LMS and have a good interaction with the instructors. Besides, the course material available on Moodle LMS should be made available to all the students without any technical malfunctions. The issue of disappearing course material after being viewed by the students should be resolved on an immediate basis to ensure that students can use course material whenever they need it. The university administration needs to integrate a group video feature on Moodle LMS to enable instructors to conduct group videos regarding any course activity with the enrolled students.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This research was funded by the Al-Zaytoonah University of Jordan.

References

[1] A. Althunibat, F. H. Al-Tarawneh, R. Dawood, and M. A. Almaiah, "Propose a new quality model for M-learning application in light of COVID-19," *Mobile Information Systems*, vol. 2022, Article ID 3174692, 12 pages, 2022.

[2] M. A. Almaiah, O. Almomani, A. Al-Khasawneh, and A. Althunibat, "Predicting the acceptance of mobile learning applications during COVID-19 using machine learning prediction algorithms," *Studies in Systems, Decision and Control*, vol. 348, pp. 319–332, 2021.

[3] A. Althunibat, "Determining the factors influencing students' intention to use m-learning in Jordan higher education," *Computers in Human Behavior*, vol. 52, pp. 65–71, 2015.

[4] A. Shahzad, R. Hassan, A. Y. Aremu, A. Hussain, and R. N. Lodhi, "Effects of COVID-19 in E-learning on higher education institution students: the group comparison between male and female," *Quality and Quantity*, vol. 55, no. 3, pp. 805–826, 2021.

[5] R. P. Cohen, M. Alexandre, S. G. Glaucia, A. Annamalai, S. Chi, and S. Naseem, "Digital literacy for secondary school students: using computer technology to educate about credibility of content online," *Creative Education*, vol. 11, no. 5, p. 674, 2020.

[6] A. Althunibat, M. Abdallah, M. A. Almaiah, N. Alabwaini, and T. A. Alrawashdeh, "An acceptance model of using mobile-government services (AMGS)," *CMES-Computer Modeling in Engineering & Sciences*, vol. 131, no. 2, 2022.

[7] Keleş, M. Kaya, and S. A. Özel, *A Review of Distance Learning and Learning Management Systems*, Intechopen, London, UK, 2016.

[8] E. Abu-Shanab, N. Ababneh, and A. Momani, "E-Learning systems' acceptance: the case of eduwave in jordan," in *Proceedings of the International Scientific Conference eLearning and Software for Education*, Bucharest, Romania, April 2020.

[9] T. Almarabeh, "Students' perceptions of E-learning at the university of Jordan," *International Journal of Emerging Technologies in Learning*, vol. 9, no. 3, p. 31, 2014.

[10] A. Badah, "Relationship between the knowledge management processes and the administrative empowerment with the employees of the Ministry of Higher Education and Scientific Research-Jordan," *European Scientific Journal*, vol. 8, no. 28, 2012.

[11] A. Badran, "New trends in higher education in Jordan 2014," *Education, Economic and Development. 4th Arab-Turkish Congress of Social Sciences*, Arab Thought Forum, Amman-Jordan, 2014.

[12] M. Al-Shboul, O. Rababah, M. Al-Saideh, I. Betawi, and S. Jabbar, "A vision to improve e-Learning at the University of Jordan," *World Applied Sciences Journal*, vol. 21, no. 6, pp. 902–914, 2013.

[13] S. Ozkan and R. Koseler, "Multi-dimensional students' evaluation of e-learning systems in the higher education context: an empirical investigation," *Computers & Education*, vol. 53, no. 4, pp. 1285–1296, 2009.

[14] M. Al-Shboul and I. Alsmadi, "Challenges of utilizing e-learning systems in public universities in Jordan," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 5, no. 2, pp. 4–10, 2010.

[15] K. Wimpenny, A. Adefila, and A. DeWinter, *Jordan Opportunity for Virtual Innovative Teaching and Learning: A Needs Analysis Report Contextualising the State of the Art in International Online Teaching and Learning, with Particular Attention to the Jordanian Case*, Jovital, Ruislip, Hillingdon, UK, 2018.

[16] Y. Majadlawi, T. Almarabeh, and H. Mohammad, "Factors affecting students' usage of learning management system at the University of Jordan," *Life Science Journal*, vol. 11, no. 6, pp. 666–671, 2014.

[17] M. A. Almaiah, A. Al-Khasawneh, and A. Althunibat, "Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic," *Education and Information Technologies*, vol. 25, no. 6, pp. 5261–5280, 2020.

[18] A. Tarhini, K. Hone, and X. Liu, "Factors Affecting Students' Acceptance of E-Learning Environments in Developing Countries: A Structural Equation Modeling Approach," *International Journal of Information and Education Technology*, vol. 3, no. 1, 2013.

[19] M. Shahrabi, A. Ahaninjan, H. Nourbakhsh, M. Ashlubolagh, J. Abdolmaleki, and M. Mohamadi, "Assessing psychometric reliability and validity of technology acceptance model (TAM) among faculty members at shahid beheshti university," *Management Science Letters*, vol. 3, no. 8, pp. 2295–2300, 2013.

[20] Alkhawaja, M. Ismail, and M. Halim, "Challenges of e-learning system adoption in Jordan higher education," *International Journal of Academic Research in Business and Social Sciences*, vol. 9, no. 9, pp. 487–494, 2019.

[21] A. Majdoubeh, *E-Learning for Extraordinary Times*, Jordan-Times, Amman, Jordan, 2020.

[22] K. Baired, "Caring for educators is the first step in serving students," *The Journal*, 2020.

[23] A. Althunibat, M. A. Almaiah, and F. H. Al-Tarawneh, "Examining the factors influencing the mobile learning applications usage in higher education during the COVID-19 pandemic," *Electronics*, vol. 10, no. 21, p. 2676, 2021.

[24] E. Dorn, B. Hancock, J. Sarakatsannis, and E. Viruleg, *COVID-19 and Student Learning in the United States: The Hurt Could Last a Lifetime*, McKinsey & Company, Chicago, IL, USA, 2020.

[25] A. M. Stern, M. S. Cetron, and H. Markel, "Closing the Schools: lessons from the 1918–19 US Influenza Pandemic: ninety-one years later, the evidence shows that there are positive and negative ways to do it," *Health Affairs*, vol. 28, no. 1, pp. w1066–w1078, 2009.

[26] A. Walters, "Inequities in access to education: lessons from the COVID-19 pandemic," *The Brown University Child and Adolescent Behavior Letter*, vol. 36, no. 8, p. 8, 2020.

[27] L. Mishra, T. Gupta, and A. Shree, "Online teaching-learning in higher education during lockdown period of COVID-19 pandemic," *International Journal of Educational Research Open*, vol. 1, 2020.

[28] C. Chabbott and M. Sinclair, "SDG 4 and the COVID-19 emergency: textbooks, tutoring, and teachers," *Prospects*, vol. 49, no. 1, pp. 51–57, 2020.

[29] C. R. Wright, V. Lopes, T. C. Montgomerie, A. Reju Sunday, and S. Schmoller, "Selecting a learning management system: advice from an academic perspective," *Educause Review*, vol. 2, no. 3, pp. 1–18, 2014.

[30] R. M. Ndegeya, *Comparison of Learning Management Systems*, selecthub, Austin, TX, USA, 2019.

[31] Al-Adwan and S. Ahmad, "Developing a holistic success model for sustainable e-learning: a structural equation modeling approach," *Sustainability*, vol. 13, no. 16, p. 9453, 2021.
[32] M. Abduljawad, A. Ahmad, K. M. Jaber et al., "Evaluating and adopting E-learning systems in Al-zaytoonah university of Jordan," *International Journal of Advances in Soft Computing and Its Applications*, vol. 12, no. 3, pp. 82–99, 2020.
[33] A. S. Al-Adwan, H. Yaseen, and A. Alsoud, "Novel extension of the UTAUT model to understand continued usage intention of learning management systems: the role of learning tradition," *Education and Information Technologies*, vol. 27, pp. 3567–3593, 2022.
[34] M. G. Moore, "Theory of transactional distance," *Theoretical principles of distance education*, vol. 1, pp. 22–38, 1993.
[35] S. L. Greener, "Self-aware and self-directed: student conceptions of blended learning," *MERLOT Journal of Online Learning and Teaching*, vol. 4, no. 2, pp. 243–253, 2008.
[36] C. A. McQuiggan, "The role of faculty development in online teaching's potential to question teaching beliefs and assumptions," *Online Journal of Distance Learning Administration*, vol. 10, no. 3, pp. 1–13, 2007.
[37] H. Lee and I. Rha, "Influence of structure and interaction on student achievement and satisfaction in web-based distance learning," *Journal of Educational Technology & Society*, vol. 12, no. 4, pp. 372–382, 2009.
[38] A. Strauss and J. Corbin, *Basics of Qualitative Research*, Sage publications, Thousand Oaks, CA, USA, 1990.
[39] K. Yu-Chun, Walker, E. Andrew, B. R. Belland, and K. Schroder, "A predictive study of student satisfaction in online education programs," *International Review of Research in Open and Distance Learning*, vol. 14, no. 1, pp. 16–39, 2013.
[40] M. Murray, J. Pérez, D. Geist, and A. Hedrick, "Student interaction with content in online and hybrid courses: leading horses to the proverbial water," *Informing Science: The International Journal of an Emerging Transdiscipline*, vol. 16, 2013.
[41] C. Baker, "The impact of instructor immediacy and presence for online student affective learning, cognition, and motivation," *Journal of Educators Online*, vol. 7, no. 1, p. n1, 2010.
[42] K. E. Rudestam and J. Schoenholtz-Read, "The flourishing of adult online education," *Handbook of Online Learning*, pp 1–28, Sage Publication, Thousand Oaks, CA, USA, 2010.
[43] P. Lowery, "Interactive assignments for online students," *Journal on Systemics, Cybernetics, and Informatics*, vol. 7, no. 2, pp. 7–10, 2009.
[44] A. Adwan and S. Ahmad, "Towards a sustainable adoption of E-learning systems: the role of self-directed learning," *Journal of Information Technology Education: Research*, vol. 21, 2022.
[45] M. A. Almaiah, A. Al-Khasawneh, A. Althunibat, and O. Almomani, "Exploring the main determinants of mobile learning application usage during covid-19 pandemic in Jordanian universities," *Studies in Systems, Decision and Control*, vol. 348, pp. 275–290, 2021.
[46] K. M. Jaber, M. Abduljawad, A. Ahmad, M. Abdallah, M. Salah, and N. Alhindawi, "E-Learning mobile application evaluation: Al-zaytoonah university as a case study," *International Journal of Advances in Soft Computing and Its Applications*, vol. 13, p. 3, 2021.