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Introduction

Learning Management System (LMS) is a software that is used in administration, reporting and other training exercises (Al-Dmour, 2014). This chapter investigates the existing LMSs, the functionality of an LMS, the strengths and weaknesses of an LMS, and the status of the LMS in higher education at Jordanian universities. The difference between the most popular LMS tools will then be discussed. This approach was used to identify important factors that could or do affect the acceptance of using an LMS at Jordanian universities. The existing literature provides substantial evidence of what these factors might be and how they might be modelled in terms of their effect on LMS use at Jordanian universities. These insights are used to develop research propositions about the relationships between the factors and to build a conceptual framework of the acceptance of LMS practices.

A good and effective LMS leverages new ways for learning in higher education learning and professional degrees. Everything is now organised electronically and stored digitally. Innovating technology has created new flexible and collaborative platforms that enhance learning. Moodle is an example of one LMS that is spreading around the world (Ahmad, Chinade, Gambaki, Ibrahim, & Ala, 2012).

1. Insight into the learning management system (LMS)

Iskander (2008) and Whelan and Bhartu (2007) identify LMS as a macro level term that refers to facilitating and managing the online learning process for all user profiles. These user types are students, administrators or instructors. The services facilitated by the LMS include interactive strategies, and organising and monitoring control among learning groups. According to Kats (2010, p. 163), there are six tasks that are involved in an active LMS. These six tasks include:

a. **Creation** “refers to the production of learning and teaching materials by instructors”.
b. **Organisation** “refers to the arrangement of the materials for educational purpose (e.g., combining them into modules or courses)”.
c. **Delivery** “refers to the publication and presentation of the materials, so that they can be accessed by students”.
d. **Communication** “refers to the computer mediated communication between students and instructors and among students”.
e. **Collaboration** “refers to students jointly working on files or projects; it also includes collaboration between instructors”.
f. **Assessment** “refers to the formative and summative evaluation of learning process and outcomes, including feedback”.

LMSs are software that has been created to improve operations in the higher education sector. They can be used to monitor and control the learning and training conducted in any organisation (Babić, 2012). It affects societies such as Jordan especially the people that are involved in LMS and also the people around these learners attain a number of benefits in many ways such as increasing the performance and speed up data retrieval. Commonly used LMSs are Moodle, Edmodo, Blackboard, Sumtotal System and Skillsoft (Gautreau, 2011). Among these mentioned systems, Moodle is the most commonly used learning system. Moodle provides an open atmosphere for the learner to nourish and build upon their current knowledge base. Every year there is a significant increase in the number of users of these top five LMSs. The number of users continues to increase exponentially (D. McIntosh, 2014).

1.1 Widely used LMS tools

A good and effective LMS leverages new ways for learning in higher education learning and professional degrees. Everything is now organised electronically and stored digitally. Innovating

technology has created new flexible and collaborative platforms that enhance learning. Moodle is an example of one LMS that is spreading around the world (Ahmad et al., 2012).

a. Moodle

Currently, there are many new LMSs entering the market and creating a competitive atmosphere. At the top is Moodle, which is used the most all around the world. It has a large number of users and every year the number of users keeps increasing (D. McIntosh, 2014). According to Cole and Foster (2007), people have become fans of Moodle because it provides an open platform to people that provides huge support to the learner. Moodle is free, and open source, and gives its users access to different resources that reference each other and are strategically linked.

There is no restriction or barrier for a learner to get knowledge using relevant learning systems. Many prominent educational institutes prefer and partner with Moodle in order to facilitate their learners effectively and efficiently (Kats, 2010). Moodle provides a range of opportunities to teachers and students to share their work and collaborate online. This creates a positive and interactive learning environment (J. McIntosh & Torres, 2014). An interesting thing about Moodle is that although extremely complex, it is easy to understand. Once a learner is trained in its use, then it is surprising simple for them to adopt Moodles learning protocols and processes (Whelan & Bhartu, 2007). Moodle is multi-beneficial, in that it has many features and the learner can enjoy knowledge in creative ways. From simple to complicated, Moodle has many features. There may be features that learners never see, but it still provides a myriad of diverse capabilities and activities for its users (Cole & Foster, 2007).

b. Blackboard

Blackboard is another online e-learning platform. It is used not only for learning purposes, but also for online transactions (Fink, 2013). It has many significant features that set it apart and distinguish it from Moodle (Khafajeh, 2014). It uses new emerging techniques for the learning process and builds an interactive forum for community. It allows sharing of learning materials to a macro level (Iskander, 2008). Blackboard makes it easier for the learners to connect and communicate. It makes it possible that to alleviate most of the ambiguities learners experience for a more satisfying learning experience (J. McIntosh & Torres, 2014). Using different tools and new technologies regulates information among users and creates platforms much like classrooms to enable discussion and analysis of learning programs. All discussions are easily carried out, along with critical and argumentative discussions. So one can say that adopting some of the latest learning systems on the market creates a healthy environment.

Organisations and universities find price to be the major barrier that prevents them from leveraging these systems in various facets of their lives. The majority of learning system users prefer Moodle and other free LMSs over those with expensive licensing fees. Contractual conditions also restrict users to use only one Blackboard at a time. These contracts are typically established over a long term (Cole & Foster, 2007).

c. WebCT

Another LMS is WebCT. It stands for web course tools. It is a well-managed online e-learning system that enables students to use various tools that are helpful in understanding and delivering lectures. It is a well-organised and managed platform that provides complete content represented in a way users can easily comprehend, and which is conducive to learning overall. It is highly interactive and engages users to actively participate in learning activities and receive feedback, regardless of whether they are performing it in isolation or as part of a group (Iskander, 2008).

Various interactive tools exist, such as discussion platforms, conferencing, delivering lectures and many more. The communication between the user and system also facilitates communication among other learners. It drives the interest of students and develops their interactive capacity to convey information and knowledge. WebCT has received much criticism and, subsequently, there are less users of it compared to Moodle and Blackboard (Iskander, 2008; Kats, 2010).

d. Sakai

Sakai is another LMS that is open source educational software (Kats, 2010). It widens user knowledge and uses creative teaching techniques (Watson & Watson, 2007). There is a special licence that allows students to utilise this software as individuals to expand their learning abilities. It is interesting not only for students, but also for organisational members and staff. There are many tools that Sakai uses to create an interactive forum and conduct lessons sessions that include video, chats and discussions (McLeod Jr & Schell, 2001). Users collaborate with one another and work together in groups (Phillipo & Krongard, 2012). An interesting trait that Sakai shares with Moodle is that it has no fee. No licence is required to use Sakai (Kats, 2010). A good peer learning is conducted here as a result. Sakai gets updated much as compared to other and no external person can close it as it is free from external factors and has special licence. Significant features of Sakai are that it is collaborative, secures private data, establishes links to many sites containing related information, provides a platform for study groups, provides organised lectures, builds communication and interaction, improves writing skills and presents all forms of information in a creative manner for students (Laflen & Smith, 2017).

Research indicates that Blackboard was previously one of the most popular learning systems, but its use has decreased recently, while the use of open source LMSs continues to increase on a global scale (J. McIntosh & Torres, 2014). Its place in the market grows as the ability for technology to

connect users around the world proliferates. Its usage increased 33% from 2005 to 2009 (Kats, 2010). Moodle rates as the preferred learning system by all, as it is open source, free and gives the learner a broader platform on which to work (Cole & Foster, 2007). According to The Campus Computing Project, (2008), 13.8% of participating students identified Moodle or Sakai as the campus LMS, while the number were 10.3% in 2007 and only 7.2% in 2006. All the learning organisations prefer either Sakai or Moodle, but the majority have adopted Moodle, and the number of users is also increasing every year. Both public and private sector both universities, especially those offering engineering and computer sciences, use Moodle (28%), Sakai (32%) and Blackboard (40%). In conclusion, the latest developments in the e-learning and LMSs has broadened their capabilities, and they have been adopted by all universities in developed countries (Mwalumbwe & Mtebe, 2017).

1.2 LMSs in Jordanian universities

Despite selected Jordanian faculty members having successfully adopted and established an LMS in their teaching, others continue to struggle integrating basic LMS technology and tools designed to support the new learning approach (Cuban & Cuban, 2009; Morgan, 2003; Walsh, 1993). According to Cho and Berge (2002), the most influential factors with regard to the adoption and deployment of LMS are the culture and norms of those working in higher education faculties.

The literature emphasises that the level of encouragement provided by faculty and institutional support personnel is the most significant factor influencing the successful application of instructional technology in the context of learning in higher education (M. A. Al-Shboul & Alsmadi, 2010; Butler & Sellbom, 2002; Morgan, 2003; Ndahi, 1999).

Many faculty members choose to use an LMS for two main reasons. Firstly, some academic staff understand and value the way the LMS facilitates and simplifies communication between students. The motivator for the second group is more obligatory in that they are expected and are under internal pressure to integrate the LMS (M. Al-Shboul, 2007; Dealtry, Macpherson, Homan, & Wilkinson, 2005; Reilly, Vandenhouten, Gallagher-Lepak, & Ralston-Berg, 2012). This indicates that the motivation for the acceptance of the LMS by some faculty members is purely because it is mandated, and they are therefore forced to incorporate it without really appreciating the benefits. Current teaching practice advocates using an LMS as part of the curriculum (Nelson, 2003). Nelson's literature review concludes the main rationale and purpose of LMS applications is to provide a simple communication platform for students that is conducive to communication and collaboration (Coogan, 2009; Dietz-Uhler & Bishop-Clark, 2001; Grandgenett & Grandgenett, 2001; Nelson, 2003; Selim, 2007; Strudler & Wetzel, 1999).

A study conducted by Gautreau (2011), demonstrates that 100% of faculty members surveyed use LMS applications daily; however, only 33% use the same software. Nelson (2003) reveals that faculty members frequently do not have the skills to integrate the necessary LMS technology to support their teaching processes. Babić (2012) highlights the need to investigate why only a proportion of the faculty members adopt and benefit from an LMS.

M. Al-Shboul (2011) presents a number of reasons why a traditional teaching approach continues to be used in higher education: faculty members' resistance to change, lack of technology skills and knowledge, insufficient IT support and personnel, and inadequate training and assistance with technology. Also, a study undertaken by M. Al-Shboul (2013) at the University of Jordan (UJ) involving 1314 faculty members found that the most common difficulties relating to the

implementation of e-learning applications are not enough time dedicated to learning new tools (workload), a scarcity of technology training and provision, and unsatisfactory institutional encouragement, support and incentives.

2. User interaction with LMS

LMSs are used by various educational universities in order to conduct a stimulating, multimedia rich, learning environment and assist people in attaining their goals more efficiently and effectively. They also regulate personal mastery and evaluate processes and use of human resources. Human resources may include all the staff, both external and internal members. Following are the functions of an active, healthy and productive LMS (S.-W. Kim & Lee, 2008; D. McIntosh, 2014).

LMS tools has a competitive system in managing differently, because each organization has different LMS tools and users. LMS tools allow the user to search any course and they can provide complete information on the course. Furthermore, online training cab be initiated that is helpful not only for students, but also for instructors and managements. There is also security and privacy (McLeod Jr & Schell, 2001). The LMS tools increase and widen the capability of students and teachers, and provide a platform for gaining information on multiple topics. Moreover, debate and discussions platform with known limitations (Morgan, 2003). This creates better understanding and learners are able to learn more (Williams, 2002). Additionally, it builds individuals' skills and brooders the communication capacity of learners. The LMS also provides an online test platform that is able to test ability in different courses. Likewise, it allows creations of tasks and modules that are helpful in many ways (M. Al-Shboul, 2007). Finally, an LMS can create and design a synchronous course activities and communication outside the face-to-face class (M. Al-Shboul, 2013).

3. Merits of an LMS

A significantly proportion of the population around the globe enjoy a number of benefits of LMSs, as people in different fields utilise LMSs (Igbaria, Guimaraes, & Davis, 1995). Individuals mostly related behaviour sciences that include different participations' benefit from actively using LMSs. These people are mostly learners, instructors and other management bodies such as manufacturers and distributors of pharmaceutical products, bodies involved in health and hygiene, marketing and finance, fuel suppliers, distributors of goods and people involved in environmental university (Watson & Watson, 2007).

4. Limitations of an LMS

LMSs are very important in different universities, but they also has some disadvantages:

a. **Computer anxiety:** Researchers define computer anxiety as "the fear or apprehension felt by individuals when they used computers, or when they considered the possibility of computer utilization, Thus, computer anxiety can negatively impact learners' acceptance and use of LMS" (Heinssen, Glass, & Knight, 1987; Murshitha & Wickramarachchi, 2016).
b. **A large number of criteria:** According to Abdullateef, Elias, Mohamed, Zaidan, and Zaidan (2016) there are many difficulties in the selection of appropriate software for business needs given the large number of open source software (OSS-LMS) packages available on the market.

The final assessment of the individual elements is essential to make a decision. Researchers can detect the weak points of any systems (Whelan & Bhartu, 2007).

5. LMSs in higher education

Learning management systems are widely used in fields such as computer science and the arts (M. Kim, 2008). Various courses offered by engineering universities are through LMS software (Whelan & Bhartu, 2007). The digital LMS model has largely advanced as a response to the new digital way of interacting with others as part of everyday life (Reilly et al., 2012). An LMS enables students to manage and manipulate large amounts of data that would otherwise require excessive effort if sorted by someone manually (J. McIntosh & Torres, 2014). An LMS is applicable for all types of study and those who benefit most are students of computer science and engineering. The new trend is to obtain and share knowledge online. In computer science, it facilitates teachers and allows instructors to easily explain and demonstrate concepts and techniques using screen sharing functionality and other tools provided by LMSs (Khafajeh, 2014; Majdalawi, Almarabeh, & Mohammad, 2014).

Learning through learning systems is more fruitful than other teaching mechanisms (McLeod Jr & Schell, 2001). According to Garrote Jurado (2012), there was a survey undertaken in engineering schools that studied the utilisation of an LMS in the teaching process. The results stated that the instructors could not use the LMS due to the risk there might be an adverse result on their teaching and, ultimately, learning. Proper results could be derived only if proper utilisation is carried out. To eliminate any threat to the educational process, instructors adopting the learning system should be subject to mandatory training to ensure they implement it as intended. Work performed by computer science students is mostly of a practical nature.

The theory and originating discussions leading to the inception of ideas and breakthroughs are not as effective if they are not incorporated as part of a learning system and integrated as part of its functionality. Video calls and online chat through the LMS can remove this hindrance. As a result

computer science learning takes places effectively, and efficiently which is of great practical importance (M. Kim, 2008).

6. Research on LMS tools at Jordanian universities

Jordan is one of the developing countries with limited recourses, and the government of Jordan is trying to exploit Information Technology (IT) to compensate for the lack of resources (Majadlawi, Almarabeh, & Mohammad, 2014). LMS tools become an easily used for Jordanian people especially in the school stage (Majadlawi et al., 2014). According to the Economist Intelligence Unit (EIU) of the 68 entries, Jordan is ranked 54th worldwide. This indicator might qualify Jordan as a suitable environment to conduct research on LMSs in general and their use in universities specifically.

In order to cope with scientific progress, the Jordanian Government realised the importance of developing (IT). As a result, it has taken serious measures in adopting IT in many fields (Al Bakri, 2013). There are obviously many beneficial aspects of applying IT in different fields, particularly in Jordanian universities. However, there are many obstacles that hinder successful IT implementation. Amongst these obstacles are the lack of knowledge of IT, the availability of dictated plan and users' deep understanding of IT applications. Additionally, the existence of consistently secure and reliable IT infrastructure plays an important role in determining the successful IT implementation amongst Jordanians (Al Bakri, 2013). Information on these obstacles will be presented in more details in the next section.

7. LMS use and facilities in the Jordan universities

The following literature review analyses research on the most significant benefits, obstacles, implications and effects of an LMS use in Jordanian universities. The review explores the most

pertinent issues and aspects of the introduction of LMSs in Jordanian universities today. Moreover, the suppositions regarding the key outcomes of LMS integration are the result of a thorough investigation of its influence on the academic process.

EL-Seoud, Al-Khasawneh, and Awajan , surveyed 160 students from PSUT who were participating in web based learning to determine if and how the digital medium enhances the education process in Jordan at university level. The findings identify and highlight issues regarding students' ability to comprehend and retain the content and knowledge of the subject matter. Additionally, students overwhelmingly preferred the web-based version of the course over the traditional classroom style. The study also reveals how the use of a web-based format, tools and automatic standardised grading functionality considerably reduces the concerns of faculty members in relation to assessing students consistently and fairly.

Majdalawi et al. (2014) surveyed 240 UJ students about factors they perceive affect students' ability to learn when using an LMS at university. This study also raises important issues about UJ students using the popular "Moodle" LMS. Students are now comfortable and familiar with the LMS software and workflow. University students almost unanimously deemed "Moodle" very useful therefore heightening the awareness and support of academic decision makers. As a result of student progress, responses and feedback, the adoption and integration of the LMS continues to increase.

This study highlights how some academic faculties benefited more than others, and reveals inconsistent results for the LMS integration success rate. It appears that faculties where students typically possess a high level of computer literacy seamlessly integrated LMS, whereas those such as the arts and social sciences are not exploiting any of the benefits of LMS. These findings illustrate the need for all students to be well versed, competent and comfortable using technology.

Almarabeh (2014) undertook a study on 180 UJ students and found that those most fluent with the LMS software were considerably more likely to leverage and benefit. Students' attitude, including their perceptions and overall view of the LMS, was ultimately the most critical factor affecting the successful integration of the innovative learning landscape. For example, if students harboured negative preconceptions about the LMS they generally failed to successfully implement and/or integrate the LMS. In contrast, those who were excited, typically IT and technology savvy students, embraced and consequently evolved in a large way by integrating the LMS. The researcher impresses the need for all faculty personnel learning and supporting each other's transition from a print-based, traditional learning model to a digital context. If the LMS content is not comprehensible to all users as intended the message is lost in the medium and is never imparted. Even scholarly, highly intelligent people are essentially illiterate if they are not able to use the LMS software properly and absorb the data presented in this new topology and form.

AlQudah (2014) study involved 80 instructors from different UJ faculties, and points out that technical support further influences the ease and transition of faculty members transitioning to the LMS. He also references additional studies where results support his theories and recommendations.

The current state of LMS applications in Jordan universities has not been widely studied researchers, because there are differences in using and exploiting LMS tools between the faculties departments and users. There are a considerable number of studies that focused on the state of technology in Jordan in the educational context; however, their focus is on the level of technology in general, rather than LMS applications in particular. Therefore, this research study will fill this

gap in the literature. The following table is a summary of prior studies on LMS in Jordanian universities.

Table 1: Summary of Prior Studies on LMS in Jordanian universities

Author(s) / Year	Study design	Research aims	Sample	Data collection	Main findings
Atoum, Issa **Otoom, Ahmed** **Ali, Amer Abu / 2017**	International Journal of Information, Business and Management	To implement the National Information Assurance and Cyber Security Strategy (NIACSS) of Jordan	Not mentioned	Case study	Results are demonstrated to NITC directors and security managers. They have made a consensus on the applicability of the HCS-IF to implement the CSS of Jordan. They had suggested a need for further analysis in the fields of human resources and change management which are outside the scope of our research.
Ayman Ahmed AlQudah / 2014	European Scientific Journal	To identify staff attitudes towards Moodle.	80 instructors	Survey & Interview	Technical support has a positive effect on the perceived usefulness of The instructors significantly tend to like Moodle and see using it is a good idea. The instructors' answers is because they lack computer skills, unlike the IT department. This leads to the difficulty most staff face and making Moodle easy would be an issue. Also, this may relate to resistance to issues of change.
Almarabeh, Tamara / 2014	iJET, journal article	To examine students' perception of E-learning at the	180 students	Survey	The students of the University of Jordan are highly qualified to use E-learning system

		University of Jordan			and have sufficient awareness of benefits of this system. The results revealed that the perceived usefulness and perceived ease of use are factors that directly affect students' attitudes toward using E-learning system, whereas the perceived usefulness is the strongest and most significant determinant of students' attitude towards using.
Majdalawi, Yousef Kh. **Almarabeh, Tamara** **Mohammad, Heba / 2014**	Life Science Journal	To examine how students receive and how they use Moodle platform. Additional external variables were also adopted: GPA, academic year, and faculty.	240 Students	Questionnaire	The students of the University of Jordan are highly qualified to use Moodle and have sufficient awareness of benefits of this system. The results revealed that the perceived usefulness and perceived ease of use are factors that directly affect students' acceptance toward using Moodle, noting that the attitudes of students for using Moodle because of the perceived ease of use and not because of the perceived usefulness which invites the decision makers in the university to increase the awareness of the importance and usefulness of Moodle and other ICT tools. Type of the faculty is an important factor that effect on perceived ease of use and

					perceived usefulness which means the decision makers in the University of Jordan must give more attention to the students in humanities faculties to increase their skills in using computer and internet in their courses and increase their awareness about the benefits of the Learning Management Systems.
Muhannad Al-Shboul / 2013	International Education Studies	To investigate the degree of E-Learning integration at the University of Jordan. to identify potential factors related to the use of e-Learning tools by faculty members (users and non-users) at this University	1314 faculty members	Paper based survey	Offer more training sessions in the use of e-Learning tools Offer workshops concerning the technical issues in using e-Learning tools Reduce teaching loads to make more time available for employing e-Learning tools Offer rewards and incentives for using e-Learning tools Offer adequate encouragement and support concerning the use of e Learning tools such as establishing or activating faculty development programs that focus on the use of e-Learning tools

Alnsour, Ayman **Muhsen, Zahraa** **Dababnah, Maher** **Eljinini, Mohammad** **Barhoum, Khalil Ali /** **2011**	IJCSNS International Journal of Computer Science and Network Security	To introduce the e-learning system to all Isra University students. To support the understanding of the overall learning process, learning motivation, legitimatize application of knowledge, and a challenge for improving the teaching behaviours.	86 undergraduate students	Survey	Increases the student's motivation to read and search for this e-learning system, due to the fact that it does save a lot of time. Organize and manage different concurrent classes for a particular course.
Muneer Mahmood Abbad, David Morris and Carmel de Nahlik / 2010	International Review of Research in Open and Distance Learning	To investigates and identifies some of the major factors affecting students' adoption of an E-learning system in a	486 undergraduate students	Survey	Students who are frequent and/or heavy users of the Internet are more likely to use eLearning systems. Students who are confident in their ability to master an e-learning system, without help, are more likely to become users. Students are reassured by the availability of back-up technical support.

		university in Jordan.			Students believe that an e-learning system will be more useful to them if it is easy to use.
EL-Seoud, S. A., Al-Khasawneh, B., & Awajan, A. / 2007	Case Study	To better explain the need for web based courses. To measure the degree of acceptance of such method among the different users.	160 student	Survey	The online course management system was used to make available the course syllabus, the class assignment rubrics (guidelines plus evaluation criteria), and the weekly class agenda. The calendar tool was employed to inform students about on-campus events, conferences, and other resources that we thought might be of interest to the students. E-mail and bulletin board tools were used for communication between instructor and students, students and instructor, and students and students. Students could monitor their progress by accessing their grades for every activity that had a grade associated with it. Reading quizzes, class surveys, and final course evaluation were also made available online.

8. Factors in the acceptance of LMS in Jordanian universities

Many factors affect the acceptance of using of LMS in higher education sector at Jordan universities. In this section will highlight two main factors affect the acceptance of using of LMS in Jordanian context, which are: IT infrastructure and the culture in Jordan context.

The Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh, 1999) has usually been used to examine the acceptance of a new technology. In this part of the chapter, a research model is based on the TAM to investigate the acceptance of using LMSs at Jordanian universities. The component of technical support will be incorporated through the TAM model, and serves as an extension to TAM. This is conducted in order to measure the acceptance of using LMSs at Jordanian universities. The research model will explain the system usage of applying LMSs at Jordanian universities. It consists of concepts that will be refined in relation to the Jordanian Learning Management System (JLMS) and include technical support, perceived usefulness (PU) and perceived ease of use (PEOU) (Venkatesh & Davis, 2000).

Information technology infrastructure (IT infrastructure) and the Jordanian culture, which are the main elements that directly affect the acceptance of LMS in Jordan universities, followed by perceived usefulness and perceived ease of use of the LMS. After that will be tested and discussed the acceptance of using LMS and make sure it will continue use of LMS in Jordanian universities.

8.1 Information technology (IT) infrastructure for LMSs in Jordanian universities

IT infrastructure for LMSs in Jordan refers to the availability of technology in the country in general, and in universities in particular, such Internet connections, computers and LMS tools (AlQudah, 2014). Many developing countries are still struggling with lack of IT infrastructure, and this research will highlight this factor as being one of the main factors influencing the acceptance of the LMS in Jordan universities. According to Samak and Tawfik (2017), the Jordanian Ministry of Education made a five-year plan to establish IT infrastructure for public schools. This plan will be useful to identify the amount, methods and types of infrastructure used in the schools.

According to Khwaldeh, Al-Hadid, and Masa'deh (2017), the infrastructure for LMS in Jordanian universities needs to improve and suit the demands of users (students, instructors and administration users). The study highlighted some users' infrastructure needs, such as deaf and the blind users, which means there is a gap in the IT infrastructure that needs to be identified and improved to be usable for all users (students and stuff).

Donation from developed countries and organisations are being used to help upgrade the IT infrastructure for LMSs in Jordanian universities from the old infrastructure to a new platform infrastructure; however, because of other obstacles like refugees from the border country and Jordan's lack of financial resources, the improvement is slow, which means that there is a lack of infrastructure, especially in the education sectors.

IT infrastructure for LMSs in Jordanian universities positively affects the acceptance of LMS through perceived use and perceived ease of use. Two hypotheses (H) were formulated regarding IT infrastructure for LMSs as follows:

H1: IT infrastructure for LMSs has a positive effect on perceived usefulness of the LMS; and

H3: IT infrastructure for LMSs has a positive effect on perceived ease of use the LMS.

8.2 Culture in Jordan

Cultural factors affect the use of LMS tools in Jordanian universities. The unique culture in Jordan is a very important factor that influences the use of LMSs in different ways, and this research will focus on this factor through perceived use and perceived ease of use. According to Cho and Berge (2002), the most influential factors regarding the adoption and deployment of an LMS are the culture and norms of those working in higher education faculties. Therefore, pedagogical issues and the lack of technology professional training are affecting the acceptance of an LMS.

Many researchers highlight culture as one of the most significant factors affecting the acceptance of using LMSs in Jordanian universities. A limitation in the studies done in Jordan universities is that they do not reflect the real number of users, and to be accurate, the sample size should represent all types of users (Abdullateef et al., 2016; M. Al-Shboul, 2013; Al Musawi, Ambusaidi, Al-Balushi, & Al-Balushi, 2015; Atoum, Otoom, & Ali, 2017; Khwaldeh et al., 2017).

According to M. Al-Shboul (2013), “We need to spread the culture of using e-Learning technology to enhance the quality of learning”. The university management advised that more focus on user training is needed and the university culture needs to be more open to new technology to improve the quality of teaching and learning. With reference to Abbad, Morris, and De Nahlik (2009, p. 19) “Cultures that are more focused on oral traditions may

be less engaged with e-learning". Management should work more on user training so the users can accept and enjoy the new technology and look forward to new updates. According to Varis and Al-Agtash (2008, p. 74) "As a relevant factor in the dissemination of values and in the formation of society's thinking, the media are responsible for disseminating local culture and the events that occur in the world". The media today is a very important player in local social life and improving the use of any new technology. It's the key player in changing user culture and improving positively any new technology.

In this research, a significant relationship exists between the influence of culture and the perceived usefulness and perceived ease of use of adopting an LMS in Jordanian universities. There is a need to confirm this prediction with respect to the location (Jordanian universities) through this research. The relationship between cultural influence and the use of an LMS is hypothesised in this research as follows:

H2: Culture has a positive effect on perceived ease of use of an LMS; and

H4: Culture has a positive effect on perceived usefulness of an LMS.

8.3 Perceived usefulness of an LMS

The perceived usefulness of an LMS is defined as the degree to which the user believes that using the LMS would improve their learning performance (Davis, 1989). It is "the degree to which a person believes that using a particular system could enhance their job performance" and "it is the extent to which an individual believes that using the system enhances his/her performance" (Saadé & Bahli, 2005, pp. 217-240). According to Davis (1989, p. 320) "People tend to use or not use an application to the extent they believe it

will help them perform their job better. We refer to this first variable as perceived usefulness".

In the TAM, Davis (1989) suggests two determinants of computer usage: PU (perceived usefulness) and PEOU (perceived ease of use). Later, other investigators and researchers extended the TAM model to combine additional variables that could account for extra variance in computer usage technology (Gefen & Straub, 1997; Venkatesh & Davis, 2000). The advantage paradigm from behavioural decision theory is relevant to perceived usefulness and perceived ease of use (Beach & Mitchell, 1978).

The benefits of the hypotheses of IT infrastructure and culture are to encourage users (students, instructors and management) to accept any new technology and work on it to gain all the advantages and improve the quality of learning. The IT infrastructure and culture in Jordan are very important factors affecting the acceptance of any new technology to accept, including the use of LMSs in Jordanian universities (M. Al-Shboul, 2011; M. A. Al-Shboul & Alsmadi, 2010; Alnsour, Muhsen, Dababnah, Eljinini, & Barhoum, 2011; AlQudah, 2014).

This research will highlight the perceived usefulness on LMS tools from the IT infrastructure and the culture in Jordan context to show the attention of acceptance using LMS in Jordan universities. The relationship between perceived usefulness and the acceptance of LMS to adopt LMS is hypothesised as follows:

H5: Perceived usefulness in adopting an LMS has a positive effect on acceptance of the LMS.

8.4 Perceived ease of use of an LMS

The perceived ease of use of an LMS is defined as the degree to which the user believes that using the LMS will be free of effort (Davis, 1989). It can be described as "the degree to which a person believes that using a particular system is free of effort. Previous research has demonstrated that individuals are more likely to use a new technology if they perceive that it is easy to use" (Saadé & Bahli, 2005, pp. 101-132).

Davis (1989) shows that ease of use had a direct effect on perceived usefulness. Many studies on the TAM also provided strong experimental support for a positive relationship between perceived usefulness and perceived ease of use. The TAM shows that perceived ease of use and perceived usefulness have a direct effect on acceptance of using a new technology (Adams, Nelson, & Todd, 1992; Szajna, 1996; Venkatesh & Davis, 2000). Venkatesh (1999) discovered that "facilitating conditions and external control served as anchors that users employ to inform perceived ease of use about information technology" as cited in (Abbad et al., 2009, p. 167). According to Williams (2002), an important factor in determining the acceptance of technology such as an LMS is the availability of "technical support".

Both IT infrastructure and culture are very important factors that affect ease of use of an LMS. According to M. Al-Shboul (2013) IT infrastructure and culture are key players in enhancing the quality of learning. IT infrastructure should be able to support and accept any technology and software tools without obstacles. Poor infrastructure will cost any organisation money and time in activating the new tools or new technology software.

It is hypothesised that IT infrastructure and culture affect the perceived ease of use an LMS positively and negatively. Good infrastructure makes any new software easy to apply and use. With regard to culture, knowledge of the culture where a new software will be applied will allow the new technology to be easy for the uses to use for the users to use (students, instructors and managements) (Al-Dmour, 2014; AlQudah, 2014).

Perceived ease of use of an LMS shows the intention a user has to make use of a technology under a given behaviour. It was predicted that users' behavioural intention to adopt LMS has an encouraging influence on acceptance of the LMS.

H6: Perceived ease of use of an LMS has a positive effect on acceptance of LMS.

8.5 Acceptance of an LMS

The Technology Acceptance Model (TAM) "has become well-established as a robust, powerful, and parsimonious model for predicting user acceptance" (Venkatesh & Davis, 2000, p. 19). A large number of researchers have adopted the TAM to test and examine the acceptance of new technologies like personal computers (Igbaria, Zinatelli, Cragg, & Cavaye, 1997).

Davis (1989, p. 335) indicates that: "the possibility of dysfunctional impacts generated by information technology emphasizes that user acceptance is not a universal goal and is actually undesirable in cases where systems fail to provide true performance gains. Although there has been a growing pessimism in the field about the ability to identify measures that are robustly linked to user acceptance, the view taken here is much more optimistic. User reactions to computers are complex and multifaceted. But if the field continues to systematically investigate fundamental mechanisms driving user behaviour,

cultivating better and well measures and critically examining alternative theoretical models, sustainable progress is within reach".

To accept a new system, hypotheses for both perceived usefulness and perceived ease of use should be examined (Davis, 1989). The model reflects these hypotheses to measure the acceptance of new software for any organisation, especially Jordanian universities, and it will then be possible to see if it is appropriate to use this new software in these universities. The model can then be used for all universities in Jordan. The outcome will influence the continued use of LMS software in Jordanian universities in general (Almarabeh, 2014).

Acceptance of an LMS shows the perceived usefulness and perceived ease of use of an LMS under a given behaviour for continued use of LMSs in Jordanian universities.

H7: Acceptance of an LMS has a positive effect on continued use of the LMS.

9. Conceptual constructs and the research model

The Technology Acceptance Model (TAM) is "an intention-based model developed specifically for explaining and/or predicting user acceptance of computer technology. TAM has been used as the theoretical basis for many empirical studies of user technology acceptance/adoption and has accumulated ample empirical support" (Venkatesh & Davis, 2000, p. 78). The research will utilise the Technology Acceptance Model (TAM) as a framework to address all the relevant issues around the LMS context. The following is a review and definition of this framework with critical perspectives.

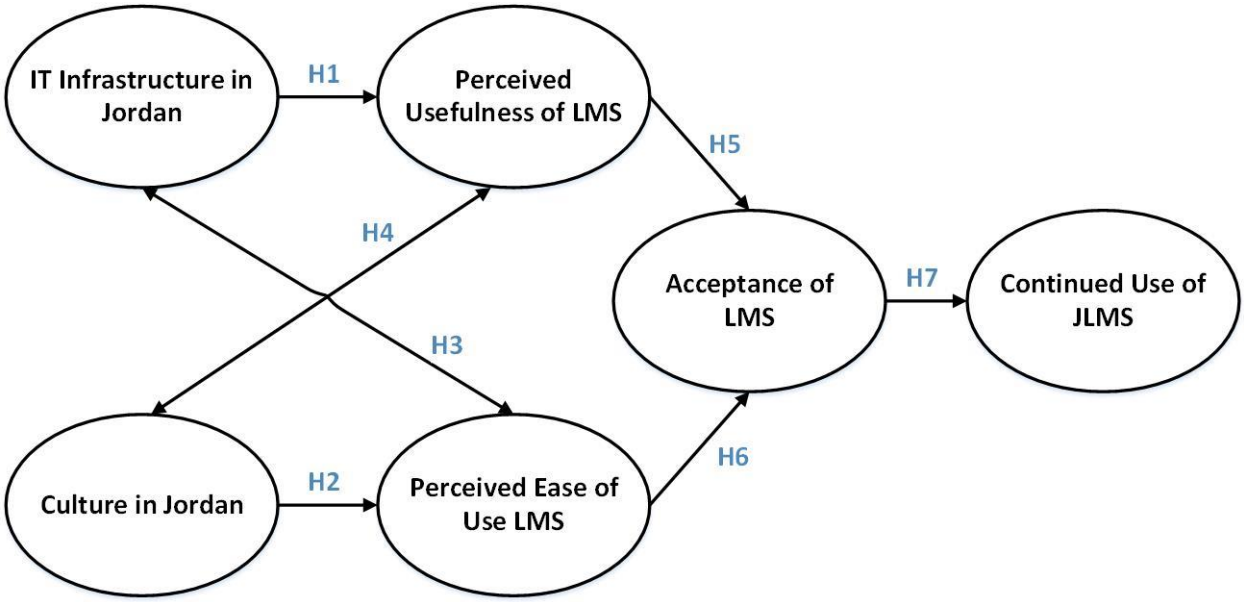

Figure 1: Conceptual framework for Jordanian Learning Management System Model (JLMS)

The literature review highlighted many hypotheses affect that suggest the acceptance of an LMS is subject to complex relations between variables. The following hypotheses were proposed:

Summarizing Hypotheses;

H1: IT infrastructure characteristics positively affect perceived usefulness of an LMS
H2: Cultural characteristics positively affect perceived ease of use of an LMS
H3: IT infrastructure characteristics positively affect perceived ease of use of an LMS
H4: Cultural characteristics positively affect perceived usefulness of an LMS
H5: Perceived usefulness of LMS characteristics positively affect acceptance of an LMS
H6: Perceived ease of use of LMS characteristics positively affect acceptance of the LMS
H7: Acceptance of an LMS characteristics positively affects continued use of the JLMS

A number of issues can affect users' decision to accept LMS tools of choice, and Jordan is one of the developing countries that experience problems such as lack of network connectivity, slow system response and social cultural issues. In this research, the many factors that affect acceptance and rate of adoption are used to understand how they

influence the diffusion rate of LMS tools as innovative instructional delivery tools. Therefore, we investigate behavioural intent to use LMS tools by employees, based on attitude, relative advantage, complexity and compatibility (Mkhize, Mtsweni, & Buthelezi, 2016).

10. Significance of the study

The study will present information that will be useful to decision makers in Jordanian universities and highlight the issues related to using an LMS in higher education and demonstrate the degree of acceptance of LMSs in Jordanian universities. In this part of study, the focus will be on six different universities: University of Jordan (UJ), Princess Sumaya University of Technology (PSUT), Philadephia University (PU), Jordan University of Science and Technology (JUST), The Applied Science Private University (ASU) and Al al-Bayt University (AABU). It will highlight the current status of each of them regarding the use of LMS in higher educational teaching. The study will investigate the following aspects:

a. Current use of LMSs in Jordanian universities
b. Factors influencing the acceptance of LMS applications in Jordanian universities
c. Attitudes of participants using LMS applications
d. Participants' knowledge of LMS applications.

According to Feeney (2001), LMSs are becoming important for university education. Adoption of LMS tools becomes for both intuitional aim and for a source of data upon which to estimate performance. M. Kim (2008) indicates that faculty workload is the main factor influencing faculty participation in an LMS (distance education). Most importantly, universities in Jordan are still struggling to deliver successful integrated LMS applications,

particularly in engineering and computer science. As a result, most of these universities may not be able to achieve their specified goals in terms of applying LMS applications.

Summary and findings

Learning Management Systems (LMS's) are the latest innovative trend facilitated by the prorogation of Information Technology allowing learning capabilities previously not thought possible. The literature review has demonstrated various e-learning strategies and their uses. Online learning is an innovative way of acquiring knowledge that is making life easier for all individuals involved in learning. This chapter has summarised the viewpoints of other researchers and authors. It has also discussed main factors influencing the acceptance of using LMS at Jordanian universities, which are IT infrastructure and culture and the hypotheses between both main factors with perceived usefulness and perceived ease of use to generalise this model in higher educational sectors in Jordanian universities. Additionally, the TAM model was explained, including the research limitations and the LMS application in higher educational sectors in Jordanian universities.

The results of the JLMS model can only be generalised to undergrad level at Jordanian universities. And can only be generalised to participants (students, instructors and administrators) at Jordanian university. The research instruments can only be used to similar contexts.

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