Investigating the Extent of Learning Management System Adoption in a Jordanian Higher Education Institution

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Abstract

Although E-learning has been widely accredited and acknowledged in education, very few researchers aimed to examine and characterize the picture of Learning Management System (LMS) adoption among students in general and adult workers in particular. Therefore, the main objective of this study is to determine the extent of e-learning adoption as well as to identify the high applications that are used in LMS among working adults. A total of 502 adult workers, who are currently pursuing their studies at Arab Open University in Jordan (AOUJ), were selected as a sample for this study. A survey questionnaire was employed. The results offered conceptual lenses and suggested future directions for how to accomplish the picture of LMS applications adopted.

Keywords: E-learning, Distance learning, Learning management system, Technology adoption, Applications, Adoption of innovation.

1. Introduction

Learning is a process of offering new knowledge and skills to people for improving their performance. The traditional learning process is only applied in classroom setting. Adopting new technology such as LMS provides new opportunities to change the learning into a lifelong learning process. Information technology allows the learning process to be conducted virtually. LMS is relatively a recent innovation system of interconnected institutions to store, create and transfer the skills, knowledge and artifacts which define new technologies [i].

Educational institutions, all over the world, are seeking to fill the demands for education. One of the significant solutions is taking advantage of the various information communication technologies (ICT) available today. The proliferation of the information technologies has an impact on the way in which learning is being delivered. Because of the rapid growth of information technology, LMS, internet and e-learning have appeared as the new model in modern learning [ii]. The concept of e-learning, in the widest meaning towards openness, was also emphasized [iii].

The exponential growth of LMS in various education institutions is expected due to information technology and internet. There is also an emergent body of factors that drive the usage of LMS, such as: the need for flexibility in learning and teaching, web-based environment and geographical independence, provide a lot of opportunities for improving the education process and the rapidly changing nature of knowledge [iv].

LMS offers great learning opportunities to learners at a reduced cost. In addition, it improves access to learning for disadvantaged learners as a result of geographical barriers [v]. Learners will not be constrained by locations, but also by time, because learning is determined by their own pace. Additionally, the potential benefits of LMS offer high quality learning and training for all, and increase the level of information technology literacy among learners and produce competitive workforce [vi]. Alexander [vii] identified four important benefits of LMS, namely: increasing the cost-effectiveness of learning, increasing access to learning and training, reducing the costs of learning and increasing the quality of learning. LMS has to be an alternative to traditional education. LMS helps overcome the challenges faced by traditional learning.

A new technology such as web-based authoring tools in delivering educational programs is a flexible educational process [viii]. Hence, the adoption of LMS is imperative for institutions as well as for the students themselves. Jebeile & Reeve [ix] argued that the usage and success of LMS requires overcoming the barriers that encourage the effective use of technologies including: technological infrastructure, pedagogical, quality benchmark and content.

Governments around the world had acknowledged the importance of education to enhance their human capital in the era of globalization. Likewise, the Jordanian government has also acknowledged the importance of e-learning as it offers solutions to the challenges that currently impede learning in Jordan [x]. Nevertheless, universities in Jordan are facing many problems in delivering their educational programs. These problems are mainly related to costs, availability of facilities and shortage of professors [xi]. In other words, Jordan was the first country among all Arab countries to adopt e-learning in the year 2002 [xii]. The initial effort started in 1999 when the Ministry of Higher Education of Jordan launched a USD 65 million-development program for the Kingdom's public universities. A significant part of the initial phase was to establish information technology infrastructure and to provide the universities with thousands of new computers [xiii]. The objective for the development and implementation of e-learning is to promote lifelong learning to fulfill the demands for continuous professional development in Jordan [xiv]. E-learning in Arab region, including Jordan, is a new approach for learning and teaching. In this context, Arab Open University (AOU), which was the first university in Jordan to adopt distance learning on a widespread basis, plays a critical role in e-learning development. In fact, AOU is the only university in Jordan that provides distance learning programs [xv] and [xvi].

1. Statement of the Problem

The approach of measuring LMS adoption in the previous studies has basically relied on two contexts: adopted or not adopted. In fact, these studies were emphasizing only upon one perspective in examining the LMS adoption [xvii] and [xviii]. As noted by [xix], this is relatively a thin measure to represent technology adoption. Some researchers, such as: [xx] and [xxi] argued that the success and usage of LMS depend on understanding the issues that promote the technologies' effective use including: quality benchmark, pedagogy, content and technological infrastructure. Meanwhile, only few comprehensive studies characterize and examine LMS adoption behavior [xxii]. Prior e-learning studies have been focusing on students' LMS adoption in general, while few adult workers have been overloaded [xxiii], [xxiv], [xxv] and [xxvi]. Furthermore, the types of LMS applications adopted by adult workers and their usage, that reflects their adoption patterns, are barely scrutinized. Thus, this study will examine the adoption by emphasizing on both the range of LMS applications adopted and the extent of usage to understand the overall illustration of adult workers' LMS adoption.

2. Research Questions

This study aims to provide answers to the following research questions:

3. What is the extent of e-learning adoption among working adults based on a selected set of benchmarks?

4. What are the most important applications that are commonly adopted in e-learning among working adults based on a selected set of benchmarks?

5. Significance of the Study

The results of e-learning benchmarking data offer a useful framework for different stakeholders such as administrators, information system vendors, management staff, lecturers and student support to assess the educational settings. However, there is a lack of knowledge and information available about the nature of e-learning adoption based on a selected set of benchmark. The present research has recognized the potential in undertaking benchmarking to develop the IT planning, change management and content and delivery development for e-learning adoption. The importance of exploring e-learning benchmarking are listed in six broad purposes, namely: Communication, Discussion/Forum, Course, Link, Helpdesk/Support and View. Benchmarking datasets contribute to offer an input for future e-learning system development initiatives by stakeholders. Universities can also developed future learning strategies based on empirical evidence derived from this study.

6. Scope of the Study

The scope of the present study is limited to the use of ICTs to improve the quality and flexibility of learning for adult workers in Jordan. However, e-learning, in the present study, is operationalized as the type of learning that enables access to higher education to those who are unable to attend on-campus learning for whatever reasons (distance learning). Though e-learning applications, e-mail, online library, online test, online assessment, live audio, live videoconferencing, live chat, online courses material, online grades and online registration, offer flexible and qualitative learning for all students, the focus of the current study is on the adult workers who work full time and study on a part time basis at AOUJ.

7. Literature Review

The past decade has seen an enormous growth in the use of LMS in higher education institutions locally and abroad. In theory, at least, the reasons for this is that LMS has provided the potential for rich learning environments to campus students, as well as to those who are pursuing distant learning programs [xxvii]. Much has been published about what constitutes good online teaching [xxviii] and [xxix]. This literature has expanded with institutional interests in quality of online learning environments [xxx]. However, the literature on the uptake of LMS or e-learning is limited. Recognizing the gap in the literature related to the lack of empirical findings and benchmarking frameworks on e-learning uptake, more studies ought to be conducted to examine this area of study.

8. Definitions of E-Learning

There is no consensus as to the definition of e-learning. Past studies have provided different definitions for e-learning. They used various terms for e-learning such as: LMS, online learning, online education, distance education, distance learning and web-based learning [xxxi]. E-learning is also defined as web-based learning which utilizes web-based communication, collaboration, multimedia, knowledge transfer, and training to support learners' active learning without the time and space barriers [xxxii]. Similarly, the term e-learning is synonymous to the usage of information and communication technology (ICT) in the area of education. It is also known as computer support instruction, online education or computer-aided education [xxxiii]. Generally, e-learning consists of two categories. Firstly, synchronous learning that enables interaction for individuals or groups at anytime and anywhere. Secondly, synchronous learning that enables interaction among instructors and learners at the same time.

Urdan and Weggen [xxxiv] highlighted that e-learning has a wide range of learning strategies and technologies from the use of CD-ROMS, live audio/video-conferencing, TV lectures, live chat, discussion forums, course announcements and virtual education based on web semantics. Components of e-learning comprised of content delivery in multiple formats, management of learning experience, and a networked community of learners, content developers and other information system experts who work in tandem to enable e-learning[xxxv]. E-learning is used to describe the use of any electronic means in the area of education. Gunasekaran et al [xxxvi] described this mode of learning as internet enabled learning. Lee et al [xxxvii] defined e-learning as web-based learning which utilizes web-based communication, collaboration, multimedia, knowledge transfer, and training to support learners' active learning without time and space barriers. It does not include email dissemination of course information and email communication between lecturers and students.

Despite the limited information about e-learning benchmarks, many institutions of higher learning are proceeding with the implementation of e-learning with the view to improve students' learning experience, thereby improving learning performance. Huge investment in e-learning technologies were aimed at improving quality and access, fostering innovation and increasing flexibility in providing learning service to students [xxxviii].

9. Theoretical Basis

The term Benchmarking is defined as an approach of quality assurance that started from business and management context. It is a method which is used to identify, understand and adapt the best practices from inside and outside of institutions for improving the performance. Moreover, this process is also focusing on the best practices by means of self-evaluation, including: collecting data from the system and information from previous defined benchmarks that later formulate the maps of the road to achieve the mentioned benchmarks [xxxix].The development of the Benchmarking has started from an essential tool for institutions and it is a basic component of the practices of the good management [xl].

European Centre for Strategic Management of Universities (EMSU) did many attempts to develop the e-learning quality assurance schemes internationally by, Benchmarking e-learning: Embedding Learning Technologies Institutionally (ELTI) and VET E-Learning Strategy in Australia. Unluckily, there are no public initiatives being developed in Malaysia but certain individual effort among higher learning institutions. The term which is related to the quality in e-learning studies has been argued and managed in a disjointed manner. In previous studies on benchmarking, [1] highlighted key benchmarks that include the support of the institutional, the deployment of course, the structure of the course, student and faculty support, evaluation and assessment. In view of the fact that, comprehensive reviews on benchmarking have been published by [xli] and [xlii].

According to The European Association of Distance Teaching Universities (EADTU), e-learning benchmarking contains three areas, namely: management, products and services. These are in correspondence with benchmarking framework by [xliii], [xliv] and [xlv].

10. Methodology

The main objective of this study is to determine the extent of e-learning adoption among working adults in Jordan. Data were collected using survey questionnaires that were sent to respondents by hand. The population of the current study is the adult workers who work full time and learn part time at AOUJ. This study managed to employ 600 adult workers from the target population. Random sampling method was adopted to select the number of adult workers from each faculty at AOUJ. Only 505 questionnaires were returned representing 84 percent of the total number of questionnaires being distributed.

11. Questionnaire Design

This study established a framework to characterize and measure e-learning adoption based on two dimensions, namely: the types of applications adopted and the extent of usage. The level of adoption refers to the types of applications adopted, ranging from e-mail to online registration, where the extent of usage refers to the various sub-phases of e-learning applications' usage which ranges from "Not using" the application by adult learners to the substitution phase "used all the time" that reflects the maturity of e-learning adoption. These two dimensions are used to characterize e-learning adoption among adult workers as shown in Table 1.

Table 1: Preliminary E-Learning Adoption Matrix

Extent of usage Level of adoption	Not using	Used sometime	Used most of the time	Used all the time
E-mail				
Online library				
Online testing				
Online assessment				
Live audio				
Live video conferencing				
Live chat tutorial				
Online courses material				
Online grades				
Online registration				

12. Findings

Visual approach was adopted to identify adult workers' applications with similar patterns. The main advantage of this visual approach, as compared to dendrogram, was that the level of adoption, which provides information on types of application adopted, and extent of usage for each e-learning application, could be examined simultaneously. This two-dimensional approach to depict e-learning adoption was adopted in this study. The final grouping was based on practical judgment of the researcher to see whether the grouping makes sense. Some adult learners were regrouped to coincide with adult learners with close identical adoption patterns which were obtained from the matrix in Table 1. The adjusted adoption pattern is shown in Table 1. The pattern identification approach provided an alternative method to examine what applications had been adopted. Working adults, with similar adoption patterns, were grouped and their adoption behavior could be described individually and collectively.

Preliminary results suggested six groups could be identified. The groupings that represent six major adoption patterns were further refined to obtain a smaller number of meaningful groups with similar patterns. After identifying six groups from the matrix in Table 1, the following Table 2 provides a brief summary of the characteristics of each of the six adoption groups.

Table 2: **Preliminary Groupings**

Group	No. of Learners	Description	Cases
1	60	**Level of Adoption** More than half of adult learners (56.1%) have adopted e-mail and online library, whereas about 40% of adult learners have adopted e-mail, online library, online registration and Grades. **Extent of Usage** 49% of adult learners have adopted e-learning application most of the time. 51% of adult learners have adopted e-learning application sometime. In the first group, the adult learners have not adopted e-learning application all the time.	200,195,291,217,366,191,208,289, 214,220,286,344,362,492,498,212. 222,202,205,124,150,346,352,219, 304,490,495,501,186,190,194,201, 206,211,216,221,290,292,296,305 316,345,348,349,351,354,355,360, 361,363,367,375,389,397,416,455, 494,496,499,159
2	92	**Level of Adoption** All adult learners in this group have adopted five e-learning applications; these are: e-mail, online library, online registration, online grades and online course. **Extent of Usage** 46% of adult learners have adopted e-learning application sometime. 54% of adult learners have adopted e-learning application most of the time. In the second group, the adult learners have not adopted e-learning application all the time.	179,182,15.22,23,24,28,88,89,111, 118,119,127,134,135,136,137,141, 143,144,112,130,140,154,166,176, 178,181,183,404,439,447,469,470, 472,474,475,476,477,131,163,164, 170,175,310,381,433,452,467,479, 480,482,483,484,486,487,6,33,37, 93,95,100,101,169,171,172,308,309, 319,325,326,328,333,336,339,370, 411,421,426,462,463,464,466,488, 5,30,38,302,311,329,331,334
3	115	**Level of Adoption** Adult learners have adopted all applications ranging from e-mail to online test. **Extent of Usage** 77% of adult learners have adopted e-learning application all the time. Only 23% adult learners have adopted e-learning application most of the time.	1,2,7,13,14,16,25,26,29,31,32,36,39, 41,42,43,46,47,48,49,50,51,53,54, 57,58,59,61,62,63,66,67,69,70,71, 76,77,78,79,82,83,85,86,,90,92,94, 96,99,109,110,173,174,192,193,199,2 13,207,215,218,223,224,225,227, 228,229,230,231,232,234,235,236, 237,239,240,242,243,245,246,247, 249,250,251,252,253,255,256,257, 259,260,261,262,263,264,266,267, 268,270,271,272,273,275,276,277, 278,280,281,282,284,285,303,327, 330,332,405,502
4	109	**Level of Adoption** Adult learners have adopted all applications ranging from e-mail to online Chat. **Extent of Usage** 90% of adult learners have adopted e-learning applications most of the time. While only 10% adult learners have adopted it sometime.	376,377,378,379,380,382,383,384, 385,386,387,388,390,391,392,393, 394,395,396,398,399,400,401,402, 403,406,407,408,409,410,412,413, 414,415,417,418,419,420,422,423, 424,425,427,428,429,430,431,432, 434,435,436,437,438,440,441,442, 443,444,445,446,449,450,451,453, 454,456,458,459,460,461,465,468 471,473,478,481,485,489,491,493, 497,500,196,197,198,293,294,295, 337,338,342,343,347,350,353,356, 357,358,359,364,365,368,369,371, 372,373,374,448,457
5	80	**Level of Adoption** Adult learners have adopted ten out of ten applications. **Extent of Usage** All adult learners have adopted e-learning applications most of the time.	3,4,8,9,10,11,12,17,18,19,20,21,27, 34,35,40,44,45,55,56,60,64,65,74, 75,81,97,98,102,103,107,108,113, 115,120,122,123,125,126,128,129, 133,138,139,142,145,147,149,151, 152,153,155,156,157,158,160,162, 165,167,177,180,184,185,187,188, 203,204,209,210,226,233,238,241, 244,248,254,258,265,269,279
6	46	**Level of Adoption** Adult learners have adopted ten out of ten applications. **Extent of Usage** 69% of adult learners have adopted e-learning applications all the time. 19% of adult learners have adopted it most of the time, while only 12% adult learners have adopted it sometime.	274,283,287,288,297,298,299,300, 301,306,307,73,80,105,117,132,146 72,148,161,168,189,312,313,314, 315,317,318,320,321,322,323,324, 335,340,341,52,68,84,87,91,104, 106,114,116,121

As shown in Table 2, the groupings that represent six major adoption patterns were further refined to obtain a smaller number of meaningful groups with similar patterns. The first group had adopted two applications, mainly ranging from e-mail to libraries which were used on a most of the time. Also from this group, more than half of adult workers (32 workers) had adopted four applications mainly ranging from e-mail to Grades.

The second group had a small sample size. All adult learners in the second group have adopted five applications, mainly: e-mail, library, registration, grades and online course. From the first and the second groups, adult workers, who had adopted applications, mainly ranging from e-mail to library, were used on a most of the time. In addition, adult workers who had adopted applications, mainly ranging from registration to grade were used on a sometime, while other applications ranging from registration to online course were also used on a sometime. The result from these two groups indicates the low level of application adoption and the extent of usage. Therefore, the two groups were merged to form the low-adopters category. The third group had adopted seven applications, mainly ranging from e-mail to online test, where the majority of the seven applications were used on all the time. A small number of adult learners used on most of the time. Similar to group three, group four had adopted eight applications, ranging from e-mail to online chat. From group four, 90% of the application usages were used on most of the time. In the other side of the usage, a small number of adult workers, who had adopted eight applications, used on sometime?

Table 2 indicates that group four has a similar level of adoption and usage compared to group three. Group 3 and 4 implied moderate level of adoption and usage. Therefore, both of them were merged to form the moderate-adopters. The fifth group had adopted ten applications, ranging from e-mail to live Video. From group five, all of the applications usages were used on most of the time. The sixth group had adopted ten applications, ranging from e-mail to live Video. From group sixth, the majority of the ten applications usages were used on all the time. In the other side of the usage, a small number of adult workers, who had adopted ten applications, used on most of the time, while the rest applications from group six were used on sometime. As those adult workers had adopted the whole range of applications with high usage, they were labeled high-adopters. In summary, many adult workers had used e-learning applications on most of the time.

This approach worked fairly well in identifying adoption patterns that were present in the sample. Adult workers were subsequently grouped based on similar adoption patterns. Table 3 below, presented the cluster members and final three adoption groups that derived from the matrix shown in Table 2. In addition, these final three adoption group's solution were labeled as low-adopters, moderate-adopters and high-adopters. The low-adopters group presented about 31% of the total number of adult learners in this study. Moderate-adopters represented more than half of the total number of the adult learners 44.62%. High-adopters were the smallest group as it presented about 26% of total number of adult learners.

Table 3: Derivation of Final Groups and Cluster Members

Group No	Preliminary Group	Final Group
1	60	152 (Low-adopters)
2	92	
3	115	224 (Moderate-adopters)
4	109	
5	80	126 (High-adopters)
6	46	
Total	502	502

13. Discussion And Conclusion

The approach of describing e-learning adoption in the previous studies has basically relied on two contexts, namely "adopted or not adopted e-learning". It must be stated that, these studies have been emphasizing adoption only upon one perspective of e-learning adoption [xlvi] and [xlvii]. The present study aimed to describe adoption by emphasizing upon both the level of e-learning applications adopted and the extent of usage of these applications, in order to provide an alternative approach to describe the adoption of e-learning among adult workers in Jordan.

With regards to the extent of usage, it is perceivable that the degrees to which working adults shift from conventional mode of educating to opt for internet technologies. [xlviii] suggested that real utilization of the technologies presents a better perceptive on innovation adoption. However, this fact has been disregarded in prior technology adoption research.

In the present research, the adoption is described as triggering usage of applications on a limited basis leading to the final stage, whereby an application would be substituted for an existing traditional learning method. In order to achieve the objectives, this research has expanded a framework to describe e-learning adoption on a two-dimensional matrix indicating the level of adoption and the extent of usage. With regards to the level of adoption, it was represented by ten types of e-learning application. The extent of usage, on the other hand, was measured by means of four categorical scales labelled as 'Not using', 'Used sometime', 'Used most of the time' and 'Used all the time'.

For the purpose of describing the extent of usage for each e-learning application, visual approach has been applied in this present research. Based upon the research sample which consisted of 505 working adults, results presented on the matrix (in Table 2) provide information on what applications have been adopted and the usage of these applications by working adults. The significance of visual approach is in its adaptability, without being restricted by the measurement scale when identifying adoption patterns. Furthermore, this approach provided different results in the types of adoption patterns by the working adults in the sample. To enable further analysis on e-learning adoption, three groups of working adults are derived based on re-grouping similar patterns. These groups were then classified into 'low adopters', 'moderate adopters' and 'high adopters'.

The first group, which is the low adopters, represents about 31 percent (152) of the research sample. The low adopters were involved in the early stage of e-learning adoption. As far as the low adopters are concerned, they primarily adopted applications that show their web presence, mainly on the basis of 'used most of the time'. Low adopters have exchanged e-learning applications for the conventional mode of learning. For this group, the applications which were adopted by these adult workers are restricted. The primary e-learning applications adopted by the adult workers are e-mail, online registration, online library, online grades and accessing online course material. The outcome from this research showed that these adopted types of application are predominantly adopted by adult workers. In addition, as deliberated in the literature review, a great number of learners including adult workers were not familiar with the modern technology, owing to the fact that e-learning adoption is an advanced method of learning to many students[xlix].

In other words, students who had more experience of using technology will find it easy to use a learning management system rather than students with less IT experience[l]. The second group is the moderate adopters, representing about 45 percent (224) of the research sample. With regard to moderate adopters, they utilized a great number of the applications indicating their web presence on a "used most of the time basis". The moderate adopters have switched e-learning applications to the conventional modes of undertaking learning. The adopters have primarily adopted e-mail, online registration, online library, online grades, online course material, online test, online assessment and online chat. Moderate adopters have taken the first step to adopt more advanced internet technologies and have partially integrated e-learning applications. Nevertheless, eight out of ten applications adopted by moderate adopters, mainly used most of the time. However, full integration of e-learning applications has not been implemented for this group. The third group is the high adopters, representing about 25 percent (126) of the research sample. High adopters in comparison to the moderate adopters, used the e-learning applications on a more frequent basis, whilst only a number of high adopters have replaced e-learning applications for conventional modes of undertaking learning. High adopters have placed strongly emphasizes on the adoption of all ten applications compared to the other two groups. These adopters have primarily adopted e-mail, online registration, online library, online grades, and video, online chat, audio, online course material, online test and online assessment. The results from the matrix in Table 1 also showed that high adopters have adopted e-learning applications exclusively on "used most of the time basis". These adopters have high tendency to adopt all e-learning applications compared to low and moderate adopters. Working adults, who are comfortable with e-learning system, will probably become users, owing to the fact that they are more confident. Results from this research reflected that most of the e-learning applications provided by AOUJ to adult workers are primarily "used on most of the time".

To summarize it, the ten e-learning applications were ranked based on their usage in the following order: e-mail, online library, online registration, online grades, online course material, online test, online assessment, online chat, live audio and live video. From Table 2, it is observed across the ten e-learning applications, that e-mail showed the highest level of usage. In contrast, live audio and live video showed the lowest level of usage. In order to gain a comprehensive understanding of adoption, future research should explore the subject area of innovation abandonment and identifying factors that influence adult workers' decision to discontinue innovations.

14. Acknowledgment

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