
Peer-Reviewed Article

Effectiveness of Learning Management Systems in Higher Education: Views of Lecturers with Different Levels of Activity in LMSs

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Abstract: The aim of the study was to examine the effectiveness of the Learning Management System (LMS) according to views of lecturers with different levels of activity in LMS. The research was based on a sample of lecturers ($n = 45$) who teach academic courses using Moodle. They were asked to answer an online questionnaire to assess their attitudes about the characteristics of Moodle LMS they use for their courses as well as their level of activity in Moodle.

The findings indicate that there was a significant difference between two groups of lecturers. With regard to faculty members whose level of activity in LMS is medium or higher, all of the LMS characteristics examined were very highly rated. On the other hand, in relation to lecturers whose level of activity in LMS is low, most of the factors examined were rated with lower than intermediate scores.

Possible explanations for this considerable gap of activity may be lack of knowledge or motivation. Therefore, it is recommended to identify the reasons for lecturers' low activity and train, encourage or motivate them so that they become more active in LMS.

Keywords: learning management systems; Moodle; learning; teaching

Introduction

General Background

Learning Management Systems (LMSs) are web-based platforms designed for management, documentation, monitoring, reporting, and delivery of courses in both higher education and other educational systems. They can assist in traditional classrooms, distance learning, or any combination of the two. LMSs deliver and manage instructional content and

typically handle student registration, online course administration, and tracking and assessment of student work (Ghilay, 2017).

LMSs are known by various names: course management system (CMS), learning content management system (LCMS), virtual learning environment (VLE), and virtual learning system (VLS) (Wright, Lopes, Montgomerie, Reju, & Schmoller, 2014). An LMS is defined as the following:

Software (web) application used to plan, implement, and assess learning processes. An LMS provides instructors with a way to create and deliver content, monitor learner participation, and assess performance. An LMS provides interactive features such as threaded discussions, video conferencing, and discussion forums, etc. Examples include Moodle, WebCT (Blackboard), and Sakai. (About eLearning, 2018)

Today, higher education institutions face many challenges, including the increasing number of students in their education. Learning management systems can be useful for adjusting increased enrollment, varying lessons, and supporting student learning (Dobre, 2015).

The adoption of LMS is a notable phenomenon in higher education. According to an Educause Center for Analysis and Research (ECAR) survey, 85% of faculty use an LMS, with 56% using it on a daily basis, and 83% of students use an LMS, with 56% using it in most or all courses (Berking & Gallagher, 2016; Brown, Dehoney, & Millichap, 2015).

Higher education institutions benefit from using an LMS in the following ways: (a) instructor and student access to learning content anytime and anywhere, (b) a centralized source of learning, (c) tracking and reporting tools to enhance student learning and performance, (d) increased efficiency in student activities such as assignment submission, (e) increased communication, and (f) learning analytics. Despite a successful adoption and use of an LMS in higher education, customers such as academic leaders, faculty, and students urge LMS vendors to improve LMS features and functions (Brown, Dehoney, & Millichap, 2015; Dahlstrom, Brooks, & Bichsel, 2014).

There are three main types of LMSs: proprietary LMSs, open-source LMSs, and cloud-based LMSs (Dobre, 2015). Proprietary LMSs have been licensed by developers, so the goal of the proprietary LMS vendors is to produce profits. Examples of the proprietary LMS vendors are Blackboard, D2L, and eCollege. Open-source LMSs have been made publicly available to

the source code and available free of charge to all users. Examples of the open-source LMS vendors are Canvas, Moodle, and Sakai. Cloud-based LMSs have been introduced as a convenient and low-cost way of using an array of cloud-based tools in higher education institutions (Dobre, 2015). For instance, Google Drive can be used for document sharing and collaboration, Dropbox for file storage, Skype for a communication tool, Flickr for photo sharing, and YouTube for video sharing. As LMSs have evolved over time, the emergence of the open-source LMSs and cloud-based LMSs threatens the dominant position of the proprietary LMS market (Berking & Gallagher, 2016).

Learning Management Systems have been widely adopted by higher education institutions (Mtebe, 2015). Based on the number of institutions adopting LMS, Blackboard shows the highest market share (31.4%, 1,129 institutions). Canvas (24.9%, 893 institutions) and Moodle (18%, 644 institutions) took second and third place respectively, followed by D2L (398 institutions, 11.1%), Sakai (96 institutions, 2.7%), and Pearson (45 institutions, 1.3%) (Edutechnica, 2018).

In terms of student enrollments, Blackboard also showed the highest market share (35.99%, 6,987,086 student users). Canvas (29.46%, 5,718,857 student users) and Moodle (12.64%, 2,454,441 student users) were the second and third place respectively, followed by D2L (2,317,030 student users, 11.93%), Sakai (666,356 student users, 3.43%), Pearson (86,298 student users, 0.44%), and ANGEL (3,222 student users, 0.02%) (Edutechnica, 2018). In spite of Blackboard's competitive advantage in the LMS market, their overall market share is decreasing, with the emergence of new strong competitors of open-source LMSs such as Moodle and Canvas (Dahlstrom et al., 2014).

When higher education is transferred to the LMS environment, special attention is required to maintain essential components of the higher education experience. A proper educational experience can be achieved within a Community of Inquiry (CoI) that is composed of teachers and students who are the key participants in the educational process. The CoI model assumes that learning occurs within the community through the interaction of three core elements: cognitive presence, social presence, and teaching presence. When examining LMSs, it is important to make sure that these three essential elements are indeed present. Cognitive presence is taken to mean the extent to which the participants in any particular configuration of a

community of inquiry are able to construct meaning through sustained communication. It is particularly worthy of attention when the medium of communication changes, as in the adoption of LMSs.

The second core element of the model, social presence, is defined as the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as “real people.” The primary importance of this element is its function as a support for cognitive presence, indirectly facilitating the process of critical thinking carried on by the community of learners. However, when there are affective goals for the educational process, as well as purely cognitive ones, then social presence is a direct contributor to the success of the educational experience.

The third element of the model, teaching presence, consists of two general functions, which may be performed by any one participant in a Community of Inquiry; however, in an educational environment, these functions are likely to be the primary responsibility of the teacher. The first of these functions is the design of the educational experience. This includes the selection, organization, and primary presentation of course content, as well as the design and development of learning activities and assessment. A teacher or instructor typically performs this function. The second function, facilitation, is a responsibility that may be shared among the teacher and some or all of the other participants or students. In either case, the element of teaching presence is a means to an end to support and enhance social and cognitive presence for the purpose of realizing educational outcomes (Garrison, Cleveland-Innes, & Fung, 2010; Garrison, Anderson, & Archer, 1999).

There are different ways to measure the success of an LMS adoption. Some studies are focused mainly on technical aspects, such as the practicality and simplicity of use (Pishva, Nishantha, & Dang, 2010; Landry, Griffeth, & Hartman, 2006). Other studies have used Return on Investment (ROI) in terms of value of technology investments through quantifiable financial measures as a measure of LMS success (Urbach & Müller, 2012; Govindasamy, 2001). Nevertheless, measuring LMS success in terms of ROI has proven to be difficult due to other associated intangible impacts and intervening environmental variables (Petter, DeLone, & McLean, 2008).

However, fewer studies focused on users' real experiences in using LMS as a platform for their learning and teaching activities (Servonsky, Daniels, & Davis, 2005; Stodel, Thompson, & MacDonald, 2006; Arbaugh, 2007).

Other studies have examined the success of LMSs by assessing learners' satisfaction with the system (Wang, 2003; Shee & Wang, 2008; Adeyinka, 2012). For example, Wang's (2003) method is based on the learner interface, learning community, and content personalization. This way has been widely used in various studies to evaluate LMS success (Katsidis, Anastasiades, & Zacharopoulos, 2008; Shee & Wang, 2008). Other studies have used other factors such as information quality and readiness, self-efficacy, self-regulated learning, system quality, and service quality to examine users' satisfaction with the LMS (Adeyinka, 2012; Eom, 2014).

There is research evidence that students' satisfaction with LMS is affected by the following factors: course content (Selim, 2007), perceived usefulness (Sun, Tsai, Finger, Chen, & Yeh, 2008), perceived enjoyment, and computer literacy (Liaw, Huang, & Chen, 2007). Emelyanova & Voronina (2014) claim that university students perceive the convenience of LMS as slightly above average. The system is not viewed by most learners as an effective tool for managing their learning process and students are very concerned about the assessment of their academic progress.

Ngeze (2016) argues that the use of the learning management systems in higher education is of great importance to both students and lecturers. LMSs can help lecturers save time in many activities, but to be effective it needs to be improved. System improvement should be done regularly to support various activities and increase interaction between students and faculty as well as among students. These improvements are also required for providing students with advanced features such as video tutorials or Computer Assisted Assessment (CAA).

Altunoğlu (2017) found out that although students had similar levels of success, they displayed varying approaches to the use of LMS. Variation was both found in students' prioritizing their preference of the type of e-learning material and in course content. The students' most intense criticism of the course sites focused on the quality of the content, such as exercises or chapter summaries.

A study by Mwalumbwe and Mtebe (2017), indicates that forums, peer interaction, and exercises are significant factors for students' academic achievement in blended learning.

However, the time spent on LMS, the number of downloads, and the frequency of entry did not significantly affect students' learning performance.

Additional recent studies that examined the users' perspectives found that LMSs are helpful for the convenience of learning, have a positive contribution to the learning process (Ghilay, 2017) and are effective tools to facilitate learning because of their interactive environment and availability (Kurata Y.B., Bano, R.M.L.P., & Marcelo M.C.T., 2018). Ghilay (2017) provides evidence that the effectiveness of the course site depends to a large extent on the degree of investment by the lecturer. Students explicitly point out that they received significant support for their learning process only when the LMS course site was well maintained. Indeed, the ability of faculty members to manage their LMSs depends upon the knowledge and skills that they have acquired. Faculty point out unambiguously that they need guidance and direction—without them, they find it difficult to meet student expectations (Ghilay, 2017).

A two-year study by the Mofet Institute of Tel-Aviv examined lecturer perceptions of a model designed to train faculty in the management of online courses. The study examined twenty staff members who teach in ten different Israeli teacher-training colleges and who participated in a two-year, seven academic hour-per-week course based on the training model. Faculty members evaluated the contribution of the LMS as high for their academic work (Ghilay & Ghilay, 2014).

Examining LMS Effectiveness Based on Views of Faculty with Different Levels of Activity

As mentioned earlier, there are different ways to measure the success of an LMS adoption. Studies are focused on technical aspects (Pishva, Nishantha, & Dang, 2010; Landry, Griffeth, & Hartman, 2006), return on investment (Urbach & Müller, 2012; Govindasamy, 2001) or learners' satisfaction with the system (Wang, 2003; Shee & Wang, 2008; Adeyinka, 2012). However, fewer studies focused on users' real experiences in using LMS as a platform for their learning and teaching activities (Servonsky, Daniels, & Davis, 2005; Stodel, Thompson, & MacDonald, 2006; Arbaugh, 2007). Therefore, the present study intends to face the challenge of examining the effectiveness of a learning management system, based on the academic staff experience at different levels of activity. Thus, the lecturers' attitudes regarding the following main characteristics of Moodle were examined for their three levels of activity in LMS:

1. Content management

2. Users management
3. Communication
4. Monitoring and evaluation
5. The level of service provided to learners

Method

The study examined the attitudes of lecturers in higher education in relation to the various characteristics of their Moodle LMS. The significance of high hypothetical scores is that the perceived effectiveness of the LMS is high and vice versa.

The Research Question

The following research question was worded: How do lecturers with different levels of activity in LMS evaluate the characteristics of the learning management system they use in their courses?

Population and Samples

Population. The study population addressed through the study included all the lecturers who teach at institutions of higher learning in Israel and use an LMS.

Sample. The sample that has been examined included 45 lecturers at the NB School of Design and Education, Haifa, Israel. The rate of response was 70.3% (45 out of 64). The selected lecturers have at least a low level of activity in the institutional LMS and they belong to the following three departments:

- The School of Management and Economics.
- The Department of Education Studies.
- The Department of English Studies.

They indicated their level of activity in the learning management system as follows:

1. ***Low activity level.*** Basic use such as uploading different kinds of files, creation of links, management of forums, sending announcements, hide/display of items, collection of items or full sites.
2. ***Medium activity level.*** In addition to the above characteristics (section 1): Managing the hierarchy of authorizations, restricting access to resources based on basic criteria, user registration and opening course sites, editing and duplicating items.

3. **High activity level.** In addition to the above characteristics (sections 1-2): Restricting access to resources based on complex criteria, design of formatted pages including text, hyperlinks, pictures, embedded video, etc., Computer Assisted Assessment (CAA), management of students' assignments, generating reports, importing/exporting data, backup/restoring course sites, monitoring of learners' activity and using specific applications such as a glossary, blog management, Wiki, etc.

This division is presented in Table 1:

Table 1

Lecturers' level of activity in LMS

Level of activity	Frequency
Low	15
Medium	14
High	16
Total	45

Tools

Lecturers were asked to answer an anonymous online questionnaire (five-point Likert scale: 1-strongly disagree, 2-mostly disagree, 3-moderately agree, 4-mostly agree, and 5-strongly agree) consisting of 38 items and an open ended question. All respondents were using Moodle for all their courses during the first semester of the year 2017-18 and data was collected at the end of this semester (February 2018).

Data Analysis

Table 2 summarizes the five factors examined, the items composing them, and the reliability (Cronbach's alpha), which is a prerequisite for validity. Alpha values above 0.7 indicate that items have relatively high internal consistency. In such cases, the values of the factors were determined by calculating the mean score of the items composing them.

For each factor, a mean score was calculated (including standard deviation). To determine whether there are significant differences between the assessment of lecturers divided into three levels of LMS activity (low, medium, and high), one way ANOVA was undertaken

including Tamhane's T2 Post Hoc test. Later, an independent samples T-test was conducted as well to examine whether there are significant differences between the lecturers' assessments divided into two levels of activity (low and medium or above ($\alpha \leq 0.05$)).

Table 2

Factors and reliability

Factors	Questionnaire's Questions
Content management ($\alpha = 0.892$)	<p>Convenient and easy construction of the course site.</p> <p>Effective management of a variety of resource types (text, hypertext, forums, audio, video, images, etc.).</p> <p>Easy and efficient upload of various types of files.</p> <p>Easy and efficient creation of links.</p> <p>Build formatted pages that include text, menus, images, video embedding, etc.</p> <p>Update and duplicate items.</p> <p>Hide/show items, studying units, or a full site.</p> <p>Possibility of changing the position of lecturer to student.</p> <p>Backup, export, or import of full course sites or parts thereof.</p>
Users management ($\alpha = 0.749$)	<p>The option to give users only sign-in or allow unlimited sign-in.</p> <p>Restrict access to resources based on groups, times, completion of activity, achievement of score, user profile, or combination of different parameters.</p> <p>Manage multiple groups on a single site.</p> <p>Automatic registration of students to the course site (automatic synchronization between the learning management system and the academic administration system).</p> <p>The possibility of enrolling or suspending students manually.</p>
Communication ($\alpha = 0.930$)	<p>Open and manage forums.</p> <p>Sending messages of various types.</p> <p>Manage separate communication with groups or group collections at the same course site.</p>

Monitoring and evaluation ($\alpha = 0.932$)	<p>Building a bank of various types of questions (multiple choice, matching, open questions, etc.).</p> <p>Build assignments/exercises.</p> <p>Build tests.</p> <p>Determination of test-specific characteristics (length of time, number of repetitions allowed, reliance on previous responses, provision of various kinds of feedback to examinees, etc.).</p> <p>Determination of different restrictions for different examinees in the same test (date, duration, and number of permitted trials).</p> <p>Effectively monitor test/task results.</p> <p>Export test results/exercise to spreadsheet.</p> <p>Follow-up reports on student activity.</p>
The level of service provided to learners ($\alpha = 0.942$)	<p>Operating the course website 24 hours a day, 7 days a week.</p> <p>Concentrate all learning resources in one place.</p> <p>Easy login from a variety of tools: PC, mobile, tablet, smartphone.</p> <p>Easy and quick access to all learning needs.</p> <p>Easy operation of the site.</p> <p>Overcoming time and place restrictions.</p> <p>The possibility of continuing to study outside the classroom.</p> <p>A convenient presentation of the course topics.</p> <p>Full coverage of all curriculum.</p> <p>Submission of exercises through the site.</p> <p>Submission of tests through the site.</p> <p>Effective communication with the lecturer (messages, discussion groups, etc.).</p> <p>Receive online assistance from the lecturer.</p>

Results

Table 3 presents the mean scores of the five factors divided into three groups according to the level of activity of the lecturers in the LMS:

Table 3

The mean sample scores divided into activity levels

Factor	Sample	N	Mean	S.D
Content management	Low	15	2.78	0.17
	Medium	14	4.10	0.53
	High	16	4.39	0.48
	Total	45	3.76	0.82
Users management	Low	15	3.35	0.49
	Medium	14	3.91	0.84
	High	16	4.30	0.87
	Total	45	3.86	0.84
Communication	Low	15	1.71	0.43
	Medium	14	3.52	1.37
	High	16	4.29	0.72
	Total	45	3.19	1.42
Monitoring and evaluation	Low	15	2.74	0.36
	Medium	12	3.63	0.73
	High	16	3.89	1.48
	Total	43	3.42	1.11
The level of service provided to learners	Low	15	2.59	0.19
	Medium	14	4.37	0.77
	High	16	4.62	0.45
	Total	45	3.87	1.05

Table 4 presents ANOVA results intended to find out if there are significant differences between the mean scores of the three groups of activity (low, medium, and high), relating to the above factors.

Table 4

Analysis of Variance: comparison of factors

Factors		Sum of Squares	df	Mean Square	F	Sig.
Content management	Between Groups	22.373	2	11.186	62.212	.000
	Within Groups	7.552	42	.180		
	Total	29.925	44			
Users management	Between Groups	7.091	2	3.546	6.264	.004
	Within Groups	23.774	42	.566		
	Total	30.866	44			
Communication	Between Groups	53.785	2	26.893	32.486	.000
	Within Groups	34.768	42	.828		
	Total	88.553	44			
Monitoring and evaluation	Between Groups	10.949	2	5.475	5.406	.008
	Within Groups	40.511	40	1.013		
	Total	51.460	42			
The level of service provided to learners	Between Groups	37.257	2	18.629	70.228	.000
	Within Groups	11.141	42	.265		
	Total	48.398	44			

The ANOVA results can be summarized as follows:

1. Content management: $F_{(2,42)} = 62.212, p = .000$
2. Users management: $F_{(2,42)} = 6.264, p = .004$
3. Communication: $F_{(2,42)} = 32.486, p = .000$
4. Monitoring and evaluation: $F_{(2,40)} = 5.406, p = .008$
5. The level of service provided to learners: $F_{(2,42)} = 70.228, p = .000$

The above findings indicate that there were significant differences between the groups' means, for all five factors (ANOVA, $\alpha \leq 0.05$).

Tamhane's T2 Post Hoc test was used to find out which groups differ significantly (Table 5).

Table 5

Tamhane's T2 Post Hoc test

Dependent Variable	Activity level (I)	Activity level (J)	Mean Difference (J-I)	Std. Error	Sig.
Content management	Low	Medium	1.32*	.14898	.000
	Low	High	1.61*	.12807	.000
	Medium	High	0.29	.18601	.333
Users management	Low	Medium	0.57	.25648	.111
	Low	High	0.95*	.25126	.003
	Medium	High	0.39	.31196	.538
Communication	Low	Medium	1.81*	.38278	.001
	Low	High	2.58*	.21178	.000
	Medium	High	0.77	.40774	.209
Monitoring and evaluation	Low	Medium	0.88*	.23099	.005
	Low	High	1.15*	.38134	.023
	Medium	High	0.27	.42553	.902
The level of service provided to learners	Low	Medium	1.78*	.21069	.000
	Low	High	2.04*	.12219	.000
	Medium	High	0.25	.23324	.648

As shown in Table 5, no significant differences were found between the means of “medium” and “high” activity levels for all factors ($\alpha \leq 0.05$). The mean factors for these two groups together are shown in Table 6 (“Medium or higher”) as well as the low level means. Table 6 also shows the gap between the means of these two levels of activity (Mean Difference) for each factor.

Table 6

Mean factors (descending order of “Medium or higher” activity level).

Factor	Activity level						Mean Difference (I-J)
	Medium or higher (I)			Low (J)			
	N	Mean	S.D	N	Mean	S.D	
The level of service provided to learners	30	4.51	0.62	15	2.59	0.19	1.92
Content management	30	4.25	0.52	15	2.78	0.17	1.47
Users management	30	4.12	0.86	15	3.35	0.49	0.77
Communication	30	3.93	1.12	15	1.71	0.43	2.22
Monitoring and evaluation	28	3.78	1.20	15	2.74	0.36	1.04

To determine whether there are significant differences between the mean scores of these two activity groups, an Independent Samples T-Test was conducted. The following results indicate that there were significant differences between these two groups in relation to all factors:

1. The level of service provided to learners: $t_{(38)} = 15.549, p = .000$
2. Content management: $t_{(39)} = 14.095, p = .000$
3. Users management: $t_{(42)} = 3.839, p = .000$
4. Communication: $t_{(41)} = 9.515, p = .000$
5. Monitoring and evaluation: $t_{(35)} = 4.204, p = .000$

The meaning of these findings is that, with regard to lecturers whose level of activity in LMS is medium or higher, all of the factors examined were rated with very high scores. These faculty members rank the level of service provided to learners at the highest score (4.51). The level of service is so good because the course website is active 24 hours a day; all learning resources are concentrated in one place; access is easy, quick, and convenient; there are no restrictions of place or time; and the curriculum is fully covered. Moreover, it is possible and efficient to submit exams and exercises through the site and the communication with the lecturer is very good.

The other factors also had high scores:

Content management (4.25). Content management is highly rated since it is convenient and easy to build the course site and manage a wide variety of resource types (text, hypertext,

forums, audio, video, images, etc.) and links. It is easy to create formatted pages that include text, menus, images or videos; update, duplicate, hide or display items or study units; or backup, export, and import full course sites or parts thereof.

Users management (4.12). Managing users is considered very good because there are many options, such as restricting access to registered users and limiting access to resources depending on times, completion of activity, score achievement, user profile, or combination of different parameters. In addition, managing multiple groups on a single site is possible and students are automatically enrolled in the course site and can be registered or suspended manually.

Communication (3.93). There are important options such as opening and managing forums, sending messages of different types and managing separate communication with different groups using the same course website.

Monitoring and evaluation (3.78). The LMS allows to build a bank of different types of questions; define assignments, exercises, and tests; determine specific test characteristics (length of time, number of repetitions allowed, etc.); and set different restrictions for different examinees in the same test (date, duration or number of permitted trials). It is also useful for effective monitoring of test/task results, exporting test results to spreadsheets, and monitoring of student activity reports.

On the other hand, in relation to lecturers whose level of activity in LMS is low, most of the factors examined were rated with lower than intermediate scores. These faculty members rank the users management at the maximum score (3.35) whereas all the other scores are below average: content management (2.78), monitoring and evaluation (2.74), the level of service provided to learners (2.59), and communication (1.71).

The gap between the two groups (low and medium/high level of activity) is the highest in relation to communication (2.22), but it is also substantial in relation to the level of service provided to learners (1.92) and content management (1.47). With regard to the other two factors, the gaps are smaller, but they exist and are also statistically significant: monitoring and evaluation (1.04) and users management (0.77).

The open-ended question strengthens the closed items and gives them more validity as presented in the following quotations of respondents:

Lecturers with Medium or High Level of Activity

- “The system is very convenient and efficient even in relation to what exists at the University of Haifa.”
- “In my view, the learning management system has two main advantages: (1) Uploading and arranging the learning materials according to the syllabus. (2) Creating computerized tests that are mixed, and giving an automatic score. The mixing is excellent because it is performed not only on the answers but also on the order of questions and the ability to perform random retrieval.”
- “I am very pleased with the system, using many of its capabilities, still need to examine the possibility of creating a bank of questions and preparing small tests.”
- “The Moodle system has many advantages. It is a central junction for student learning.”
- “The system enables accessibility from different locations, real-time messaging, as well as creating and receiving assignments from the students.”
- “A major advantage is that there is no need to transfer all the content from year to year and from group to group. You can work with any group and let it be tested at different times and then export the group’s scores to Excel. This is convenient and relatively easy.”

Lecturers with Low Level of Activity

- “The Moodle site is not aesthetic and it is cumbersome. In general, it seems to me that the Moodle is good mainly as a database for articles, presentations, syllabus, and various messages.”
- “The only problem for me as a program leader is the opening of courses from year to year, the need to consolidate groups and to transfer the materials from previous sites to new ones.”

These quotes stress the difference in the perception of users at a high/medium level compared to those who function at a low level. As has been found in the quantitative part of this study, lecturers with high/medium level of activity perceive the LMS as much better than the others.

Based on the quantitative and qualitative results, it can be said that lecturers whose level of activity in LMS is medium or higher are very satisfied with all Moodle characteristics examined: the level of service provided to learners, content management, users management, communication, and monitoring and evaluation. This group of faculty members explains its satisfaction with the convenience, simplicity, and efficiency of the system, claiming that it has many advantages. The main advantage is that the system is an effective central junction for students' learning, overcoming time and place constraints. Active members also argue that Moodle is very flexible while dealing with different users or groups and is excellent for real-time communication, as well as effective handling of tests, exercises, or assignments. On the other hand, the second group, which is less active, is much less satisfied with the system. Members of this group tend to complain about discomfort, lack of aesthetics, or that the system is cumbersome.

Discussion

As mentioned earlier, the evaluation of LMS success is not simple and there may be different ways to do so. Unfortunately, not too many studies focused on users' real experiences in using LMSs as platforms for their learning and teaching activities (Servonsky, Daniels, & Davis, 2005; Stodel, Thompson, & MacDonald, 2006; Arbaugh, 2007). The present study intends to address this challenge by examining the effectiveness of Moodle LMS, based on the true experience of faculty members with different levels of activity in LMS. It was very important and interesting to know how different groups of lecturers evaluate various characteristics of such systems. To be effective, LMSs need to be enhanced regularly to effectively support various activities, primarily, interactions between students and faculty providing students with advanced features such as video tutorials and Computer Assisted Assessment (CAA). There is also great importance to the quality of the course content including exercises and summaries. Other important components for effective learning in higher education are forums and peer interaction. Since LMSs need to support such complex features, a great deal of investment is required by the lecturers and they need to be guided and motivated to face this challenge (Altunoğlu, 2017; Ghilay, 2017; Mwalumbwe & Mtebe, 2017; Ngeze, 2016). Because of the large investment required, the present study intended to go a step further and examine differences between the lecturers' experience at different levels of activity.

On the one hand, findings show that there is no significant difference between the Moodle experience of lecturers using LMS at medium and high activity levels. On the other hand, there is a significant difference between lecturers using LMS at the following two levels of activity:

1. Medium or high level
2. Low level

Group 1 members assess the Moodle system as perfect with regard to all characteristics examined whereas members of the second group rank most of the features as average or less. A possible explanation for this considerable gap of activity may be that faculty members who know only the basic characteristics of the LMS are unable to use it fully. Therefore, they may only use a small portion of the total capacity of the complex system.

Another possible explanation for this gap may be that the lecturers with low activity behave this way because of the low level of motivation to invest effort.

Recommendation

The study shows that higher education lecturers who run academic courses using LMS like Moodle tend to have better experience when their level of activity is at a medium or higher level. As such, it is recommended that institutions of higher education influence their faculty members to increase their activity in LMS. In cases where the reason for low level of activity is lack of knowledge or skills, it can be helpful to direct the lecturers to appropriate training programs. Principles of using LMS in higher education as well as additional skills required for online learning, can be purchased on the basis of the TMOC (Training for the Management of Online Courses) model (Ghilay, 2017; Ghilay & Ghilay, 2014). If the reasons for the low activity are other, it is recommended to identify them, and as a result, encourage and motivate faculty members both intrinsically and extrinsically so that they become more active in LMS.

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