An examination of the impacts of a Learning Management System: A Case from Jamaica

Journal:	*21st Americas Conference on Information Systems*
Manuscript ID:	AMCIS-0536-2015.R1
Submission Type:	Regular (Complete) Paper
Track:	ICT in Sectors Critical for Transformation < ICTs and Sustainable Development in the Caribbean

An Examination of the Impacts of a Learning Management System: A Case from Jamaica

Full paper

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Abstract

Using a mixed methods approach, this paper examines the pedagogical and organizational impacts of a new Learning Management System (LMS) in a Jamaican university. Overall results show positive impacts on learning and teaching, and engagement across stakeholder groups. However, the LMS seems to have a dual impact in relation to access to resources and pedagogical practice. While the LMS offers flexible access to resources and creates new opportunities for learning and delivery across the University's urban and rural locations, it also allows for new forms of control of previously 'free' and flexible academic practices. The study highlights an inherent tension between institutional requirements and taken-for-granted freedoms associated with academic practice. This study adds to the nascent research on LMS usage that moves away from the typical technical and financial aspects of such systems to identify usage patterns and implications for all the main stakeholders.

Keywords

Learning Management System, teaching and learning, organizational change, implementation

Introduction

As globalization transforms the Jamaican landscape, there is mounting demand for the acquisition of university education. Increasing competition between educational institutions and the development of new information and communications technologies have led to the adoption of learning management systems (LMS) across the sector. According to Coates et al (2005: 19), "LMS are enterprise-wide and internet-based systems…that integrate a wide range of pedagogical and course administration tools", and typically include facilities for communication, content development and delivery, assessment and user management. In this context, pedagogy is defined as the method and practice of teaching and learning within a contextual setting of social interactions between teachers and learners (Leach and Moon 2008). Reformed educational practices and the key stakeholders including educators, administrators and students are germane to the process of LMS adoption, which often introduces organizational changes. As there is limited research on LMS in the Caribbean, this paper addresses this gap by examining the impacts of a LMS adoption at the University (anonymized), a private, Jamaican tertiary institution offering certificates, Associate degrees, Bachelors and Master's degree programs specializing in Business and Information Technology. The institution has been in existence for over thirty years and has its main campus in Kingston, where the majority of students are based. There are satellite sites with much smaller student and staff populations in rural Montego Bay and Mandeville as well as other locations across Jamaica. The primary drivers behind the adoption of a new LMS were the increasing competition from local and foreign institutions and expectations from the university management that adopting such a system would create efficiencies and help integrate multiple, disjointed information technology initiatives across the organization, enhance the teaching and learning process, and create a blended learning capability. The adopted LMS included functionalities for communication, content development and delivery, assessment and course administration.

In seeking to understand the interrelationships between this form of technology and student engagement, teaching and learning and organizational change, this paper addresses the following research question: what are the pedagogical and organizational impacts of the LMS as a new form of technology? In doing so, this study goes beyond technical and financial aspects of such systems to identify usage patterns and implications for all the main stakeholders.

The rest of the paper is organized as follows: the next section presents a brief review of the literature on the LMS and its impacts on teaching, learning and organizational practices. This is followed by a discussion of the mixed methods adopted to conduct the study. The main findings are then categorized according to the stakeholder group (students, academic and administrative staff), and finally conclusions are drawn along with some implications for theory and practice.

Literature Review

In recent years a plethora of studies have examined the benefits, pitfalls and the overarching impacts of the LMS. It has been argued that the digitization of time-consuming task offers streamlined and efficient administrative workflows, reducing costs through decreased training redundancy, operational errors and down-time, and maximizing efficiency through the integration of content delivery and leveraging the use of existing resources (Berking and Gallagher 2014). LMS have enabled educational institutions to expand rapidly while enjoying organizational efficiencies afforded by the scale of implementation (Hanon and D'Netto 2007). Coates et.al (2005: 27) on the other hand do not consider LMS as "pedagogically neutral"; they see LMS as shaping the teachers' expectations and behaviors regarding the inclusion of "online learning as a normal and necessary rather than an optional part of learning". With the rapid uptake of the LMS in universities, the age, experience and personal characteristics of teachers will invariably affect how some lecturers will manage, teach and utilize this technology. More general claims are often made that LMS will bring new efficiencies to teaching, despite the huge upfront costs associated with their adoption, such as reduction in course management overheads and physical space demands as well as enhanced knowledge management and potential for unifying fragmented technology initiatives within institutions, setting up more effective and auditable quality assurance mechanisms (Coates et al. 2005).

Studies have shown varying levels of benefits from LMS to students and teachers. LMS can facilitate enriched learning through internet technologies as it allows students to access more resources and materials, more flexibly (Berking and Gallagher 2014). They can also have far-reaching impacts on students' confidence and motivation for learning or their understanding of the significance of what they have learned through more flexible and adaptable peer-to-peer and student-teacher engagement. Smith and Rao's (2012) study of LMS use in Jamaica showed numerous benefits, in particular the ability to free up coordinators' time from mundane tasks as well as the opportunities for students to benefit from flexible assessment processes catering to varied learning styles. However, LMS use may also imply changes to established teaching and learning styles. For instance, Kuboni's (2009) study, also set in Jamaica, argued for a change to the traditional, hierarchical relationship between course coordinators and students in order to encourage students to make the transition from passive to active learners.

Lonn and Teasley (2009) show that while students idealize the saving of time as the prominent benefit, instructors appreciate the communication capabilities. However, LMS can also result in superficial teaching and assessment where there is over-reliance on multiple choice and short answer testing (Coates et al. 2005). For instance, Leask (2004: 347) found that information and communication technologies are used "in ways that do not enhance teaching and learning", for example, "dumping" large amounts of text onto a website. Kistow's (2009) study of LMS use in Trinidad showed mixed reactions to their use with many teachers claiming that LMS reduced teamwork and collaboration among students. Sclater (2008) goes further to argue that LMS can disempower students as it manages their activities and controls their access. LMS have also been seen as a reason for the "increasing loss of individuality as academics and students are relegated to cogs in the higher education machinery" (Murphy 2012: 830). There have also been criticisms with regard to the mechanization of teaching and learning resulting in increased technical work and complexity for academics and students (Weaver 2008). Some have also questioned the universal applicability of such systems across disciplines (Clarke-Okah 2009). Furthermore, costs associated with LMS are direct and visible whereas the benefits are often indirect and take time to manifest (Smith et al 2013).

LMS and Organizational Change

Building on Leavitt's pioneering work, Rockart and Scott Morton (1984) highlighted the inter-linkages between people, technology, strategy, process and organizational structure and culture in the context of information technology use. Information systems such as LMS are also bounded up in organizational politics as it influences information flow (Laudon and Laudon 2014). They further introduce changes in personal and individual routines as the employees require retraining and may take on additional efforts that may or may not be compensated. Due to the transforming nature of information systems and its impact on structure, culture, business processes and strategy, there is often considerable resistance to them (Linstead et al 2009). Indeed all of these aspects raise implications for LMS adoption and use.

Organizational changes linked with LMS involve "new forms of control and accountability …increased technological and administrative input over teaching content and practices [and]…unlike less formalized traditional materials, the sophisticated results of such collaborations are also more open to various forms of monitoring, inspection and control" (Coates 2005: 30). Previously, lecturers would work unilaterally in preparing courseware, but the LMS has created new and complex divisions of labor between administrators and teachers now warranting collaborations between them (Coates 2005). Such changes necessitate substantial restructuring of entrenched routines and procedures. Brickell (1964) asserts that major innovations impinge on and shift the normal operating procedures of six structural elements of a school: teachers, students, subjects, methods, times and places. Such innovations may require acceptance or rejection by the entire school thus relegating the freedom of choice for individuals. Any formidable changes to the orthodox roles of teachers and students will invariably elicit varying forms of resistance (Vaughan 2000).

Drawing on Rogers' Diffusion of Innovations theory, Dori et al (2002) identify four groups of teachers: 'the initiator and pathfinder' who represents the fervent and confident teacher who is stimulated to employ online technologies; 'the follower'- resonates with those teachers who utilize online technologies when it is convenient; 'the avoider' denotes the teacher who uses online technologies when he/she is compelled from administration and students; and 'the antagonist' connotes the teacher who refuses to use technology in school. LMS implementations have to contend with these different groups as they impact teaching and learning processes. Incorporation of a new technology or teaching medium restructures the existing equilibrium between technology, pedagogy and content, and creates unique challenges in the form of resistance to change. The novelty of online technologies overwhelms faculty members as they grapple with fundamental questions on their own nuanced understanding of the complex relationships between the three to develop quality teaching practices. However, Lane (2007) asserts educational institutions often uphold and preserve conservatism in practice, goals and traditional culture, thus resisting changes that may not display durability.

Methodology

This study used a sequential, mixed methods approach to understand the impact of the LMS using focus groups, in-class observation, and a questionnaire survey during September 2013 across three sites of the University: the main campus in Kingston and the satellite rural sites in Montego Bay and Mandeville. Eight focus groups were conducted at the Kingston, Mandeville and Montego Bay campuses of the University with the academic and administrative staff groups held separately. Given the support of the senior management, it was possible to send out invitations to all potential participants across the three sites, excluding any that took part in the pilot. In total 84 administrative staff and 78 academic staff from the three locations took part. A list of questions (Appendix A1) was used as a benchmark to streamline conversations and to maintain comparability across all focus groups. The focus group sessions were capped at a two hours timeframe and the critical incident approach was used. In this instance, the employees from each department were asked to recall how their roles had changed over the past two years and to comment on the effectiveness of the transformation process. To increase the content validity, each participant was pre-screened to assess their knowledge and use of the LMS and a further sensitization initiative was taken to familiarize them with often used jargon and acronyms. It was clear during this process that the vast majority of participants did not wish to be recorded. As a result, extensive notes were made during each focus group discussion.

Emanating from the focus group sessions, six lecturers from Kingston invited the researcher to observe the students and lecturers' interaction on the LMS. A 2 hour visit was undertaken for each department in Kingston, which helped to provide first-hand knowledge of the actual use of LMS in its context. Notes were taken from these observations and later used to cross check and triangulate findings from the other data collection methods.

The focus group findings influenced the survey aimed at students, which consisted of thirty questions, covering demographic details, student perceptions of the LMS, offering dichotomous options or a Likert type scale, and some open ended questions (Appendix A2). Both the survey instrument and focus group questions were based on themes arising from the literature reviewed, and were piloted on ten students and three lecturers from each location and three administrators from the Kingston location. This resulted in some changes to the initial instruments mainly to do with structure and clarity of questions. The focus group findings also resulted in some changes to the survey instrument.

The sample population for the survey was chosen to include only those students who had experienced both the pre- and post-LMS scenarios, i.e. second, third and fourth year undergraduate students. Those who took part in the pilot were also excluded. The survey was distributed to all eligible students across the three locations: 33 students in Montego Bay, 38 in Mandeville and 611 students in Kingston. Questionnaires completed by students in their own time, as this was explicitly defined as an independent research project, resulting in a total of 444 usable questionnaires with the following response rate for each of the three locations: Mandeville 89% (34/38 students), Montego Bay 76% (25/33 students), and Kingston 63% (385/611). The survey data was analyzed using SPSS.

Findings

This section presents selected results from the study and discusses the varying impacts of the LMS on students, lecturers and administrative staff with accompanying organizational changes.

Students

Results from the student survey show overwhelming support for the LMS's positive impact on learning, student engagement and quality of teaching. The students embraced the expedited administrative functionalities of the new system and welcomed the blended learning opportunities and greater access to resources. Many students noted the quality of teaching and the efficacy of the process as they can now prepare for future lessons by reviewing online materials 24/7 soon after registration, irrespective of classroom time restrictions. The availability of resource websites, PowerPoint presentations and courseware via the LMS were also seen as important, which they also noted as enhancing their learning.

Lecturers Activities

		Kingston		Mandeville		Montego Bay	
Value Label	Value/Coding	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
The lecturers' utilization of the LMS has a major impact on my usage	1	289	75.06	27	79.41	19	76
The lecturers' utilization of the LMS has a minor impact on my usage	2	90	23.38	7	20.59	5	20
The lecturers' utilization has no impact at all	3	6	1.56			1	4
		385	100	34	100	25	100

Location	N	Mean	Mode	Standard Deviation	Variance	Minimum	Maximum	Median
Kingston	385	1.26	1	0.48	0.23	1	3	1
Mandeville	34	1.21	1	0.41	0.17	1	2	1
Montego Bay	25	1.28	1	0.54	0.29	1	3	1

Table 1 Impact of lecturers' utilization of LMS

Results also clearly show that the LMS usage by students is linked to the extent of usage by their lecturers. Table 1 compares the frequencies and percentages for the question posited at each location on the impact of lecturers' utilization on students usage. In all three locations, over 75% of the respondents felt that their lecturers' utilization had a major impact on their own LMS usage. Essentially, this highlights the importance of the buy-in from lecturers for the LMS implementation.

Table 2 compares student engagement on a Likert scale to ascertain whether there was an increase or decrease at the three locations. Results from all three locations showed that student engagement increased due to the LMS.

Student Engagement

		Kingston		Mandeville		Montego Bay	
Value Label	Value/Coding	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Student Engagement has increased significantly	1	244	63.38	16	47.06	11	44
Student Engagement has increased slightly	2	51	13.25	14	41.18	7	28
Student Engagement has not changed	3	56	14.55	3	8.82	4	16
Student Engagement has decreased slightly	4	23	5.97	1	2.94	2	8
Student Engagement has decreased significantly	5	11	2.84			1	4

Location	N	Mean	Mode	Standard Deviation	Variance	Minimum	Maximum	Median
Kingston	385	1.72	1	1.09	1.2	1	5	1
Mandeville	34	1.68	1	0.77	0.59	1	4	2
Montego Bay	25	2	1	1.15	1.33	1	5	2

Table 2 Student engagement

Table 3 examined the respondents' view on the impact of the LMS on learning. The vast majority felt that there was a positive impact on learning across all three locations.

Impact on learning

		Kingston		Mandeville		Montego Bay	
Value Label	Value/Coding	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Student learning has been impacted significantly and positively	1	104	27.01	19	55.88	10	40
Student learning has been impacted slightly and positively	2	163	42.34	7	20.59	9	36
Student learning remains the same	3	59	15.32	3	8.82	3	12
Student learning has been impacted significantly and negatively	4	38	9.87	1	2.94	1	4
Student learning has been impacted slightly and negatively	5	21	5.45	4	11.76	2	8

Location	N	Mean	Mode	Standard Deviation	Variance	Minimum	Maximum	Median
Kingston	385	2.24	2	1.12	1.25	1	5	2
Mandeville	34	1.94	1	1.37	1.88	1	5	1
Montego Bay	25	2.04	1	1.21	1.46	1	5	2

Table 3 Impact on learning

Table 4 highlights that the LMS accounted for a significant positive change in all three locations for the quality of teaching and the provision of educational resources. Comparatively, the overall response was

very positive and only a minority (.03%) criticized the LMS impact on teaching quality and provision of educational resources. The average mean frequencies were also within a salient range.

Quality of Teaching and provision of educational resources since the LMS

		Kingston		Mandeville		Montego Bay	
Value Label	Value/Coding	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
There has been a significant positive change	1	173	44.94	18	52.94	17	68
There has been a slight positive change	2	168	43.64	12	35.29	8	32
There has been no change	3	33	8.57	3	8.82		
There has been a significant negative change	4	2	0.52	1	2.94		
There has been a slight negative change	5	9	2.34				
		385	100			25	100

Location	N	Mean	Mode	Standard Deviation	Variance	Minimum	Maximum	Median
Kingston	385	1.72	1	0.83	0.69	1	5	2
Mandeville	34	1.62	1	0.78	0.61	1	4	1
Montego Bay	25	1.32	1	0.48	0.23	1	2	1

Table 4 Impact on quality of teaching and resource provision

Table 5 reveals the respondents' perceived effectiveness of educational resources provided on the LMS. Of the 444 questionnaires completed, a total of 27% of the respondents felt that the educational resources were very effective and 53% of the respondents felt that the resources were fairly effective. These responses were followed by the neutral respondents and dissidents who recorded 9% and 11% respectively.

Effectiveness of educational resources

		Kingston		Mandeville		Montego Bay	
Value Label	Value/Coding	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Very effective	1	98	25.45	15	44.12	5	20
Fairly effective	2	211	54.81	12	35.29	11	44
Neither effective nor ineffective	3	35	9.09	4	11.76	5	20
Not very effective	4	28	7.27	3	8.82	4	16
Not at all effective	5	13	3.38				

Location	N	Mean	Mode	Standard Deviation	Variance	Minimum	Maximum	Median
Kingston	385	2.08	2	0.97	0.94	1	5	2
Mandeville	34	1.85	1	0.96	0.92	1	4	2
Montego Bay	25	2.32	2	0.99	0.98	1	4	2

Table 5 Effectiveness of resources

A statistical Chi square was applied between age groups and adoption rates (see Appendix A3, Tables A3.1, A3.2 and A3.3). Data emerging from the cross-tabulations at the three centers revealed that there was a significant relationship between the two variables at 0.00 level of significance in Mandeville and Montego Bay as value was less than .05. However, a non-significant relationship in Kingston was depicted with 0.45 level of significance which is higher than the approved limit of .05. It is believed that the variation in the sample sizes (with Kingston being home to a disproportionately high student population) can be the reason for this difference.

Correlation tests were conducted to ascertain the relationship between department usage and quality of teaching as well as lecturers' activities and students' engagement. As shown in Appendix A3 (Tables A3.4, A3.5 and A3.6) there was a statistically significant strong relationship and symmetry between the previously noted pairs based on the level of significance at 0.00.

Results from all three locations show a preference for using some features over others. Uploading of assignments, checking grades, registering for classes and downloading and accessing resources were the most used across all three locations. Commensurate with the literature (Sclater 2008) and the qualitative findings discussed below, the communication features (depicted in the following variables - communication with lecturers, communication with administrators, communication with students and use of discussion forum and chat sessions) were used the least.

Data from the open ended questions in the three locations underscored diverging views on the adoption of the LMS on pedagogy and was heavily skewed towards non-use of the communication features. According to one respondent: "I can't understand why the communication features are not used since there is so much to gain from the administrators, lecturers and other students". Students in rural Montego Bay and Mandeville felt far more detached from the main campus/headquarters in Kingston given the deficiency of their labs and the lack of communication prior to the adoption of the LMS. The introduction of the LMS seems to have assuaged feelings and students in these satellite locations felt more connected to their main campus post-implementation of the LMS. The mainstream response in Kingston revealed contentment with the technical support services for the LMS, but they also expressed disappointment around the LMS introduction and the associated institutional pressures towards compliance. Limited computers to support training activities for the surging student population was another key comment which meant that many students had to learn to use the system on their own. Interestingly, several students complained that lecturers simply "cut and paste" information from websites on the LMS where at times it can be "irrelevant and bulky". Such comments questioned the effectiveness of the educational resources provided via the LMS and highlights the potential for LMS to be simply seen as a dumping ground for static content (Leask 2004; Weaver et al 2008).

Lecturers

The Learning Management System has had major pedagogical ramifications for teaching staff. The main results from the focus groups with academic staff are discussed below.

Access to learning resources

Unlike the previous system where students missed vital information due to absences, the LMS creates a platform/portal for the 24/7 access to learning resources thus addressing pedagogical challenges exemplified in the form of distance constraints and surging classroom sizes (Berking and Gallagher 2014). One lecturer noted: "The use of videos and taped sessions have a profound impact on learning using [these] platforms." Lecturers now perform a custodian/gatekeeper role ensuring access control to courseware and resources, but also proprietary privileges to develop, revise and deliver course content. For instance, a Kingston lecturer advocated the full utilization of the LMS amidst surging modular enrolment for some courses. She could use the LMS to set assignments and tests to understand learning gaps and ultimately tackle them in her face-to-face sessions.

Many felt that the campus based face-to-face teaching had undergone a major transformation with opportunities for reconfiguration and programme expansion enabled by the LMS. For example, many Kingston-based lecturers highlighted the fact that they were now increasingly seeing students from other sites taking their courses via the LMS (without face-to-face attendance), something that was not possible prior to the introduction of the system.

Functional features

The assignment utility in the LMS allows students to submit digital content files, including documents in Word, Excel, PowerPoint, images and video clips, and also allow them to type their assignment directly into the system. Due dates and assignment statuses can also be shared using the assignment utility, which most lecturers found incredibly useful as a tool to push students towards meeting deadlines. The nature of the discipline seemed to impact usage. For instance while IT lecturers championed the active usage of the

LMS, Math lecturers refrained or used it sparingly due to the system lacking various mathematical symbols, a problem noted in the literature (e.g., Clarke-Okah 2009).

In relation to assessments, contrary to Coates et al (2005)'s views, lecturers from all locations preferred essays and case-based assignments over multiple choice type tests to guarantee that the learning outcomes are achieved. They argued that essays are instrumental to both the teaching and the learning process as they are inclined to examine critical thinking, reasoning and application. However, it was clear that rubric-based, timed assessments such as multiple choice quizzes were also being used as it enabled expeditious marking with annotated responses. Online marking of all forms of assessments reduced printing costs for the university but increased the burden on students who preferred to print out their marked essays and assignments.

Consistent with the findings of Sclater (2008), the lecturers noted that the interactive communication features including internal messaging and discussion forums were rarely utilized apart from group announcements and course deadlines.

Challenges encountered

Many lecturers felt that LMS could be used as a controlling device restricting access to resources, a view also expressed by Murphy (2012). For instance, despite the greater accessibility afforded by the LMS, only registered students (who had paid their tuition) had access to resources and courseware. Then there are technology-averse students who continue to grapple with the full utilization of the LMS, which ultimately leaves them disenfranchised. Ultimately, these issues have implications for pedagogy, student engagement and learning across all sample locations. For example, many lecturers have claimed that that they have resorted to print-based supplementary materials to assuage student concerns.

Amidst the criticisms such as of the loss of creativity and added bureaucracy resulting from the LMS, many lecturers felt that with the changing role of the IT infrastructure and organizational processes, there has been a marked loss of flexibility in academic practice due to proprietary rights and the introduction of support staff including administrators and ICT specialists. Others though were less strident in their criticism and argued that despite the element of control, uniformity in teaching and delivery facilitated by the LMS may help project a consistent image while helping to align pedagogical practices more quickly with the new technology.

Other challenges related to technical difficulties arising from intermittent access to the system preventing use and delaying the online transmission of resources ahead of classes. The lack of hands-on training in the orientation process was cited as a major drawback in the rural campuses of Montego Bay and Mandeville sites but those in urban Kingston received better IT support and training given its status as the main campus. Very often the reluctance to use the system more widely was due to their lack of adequate training and the associated apprehension.

Lecturers at all three locations complained that the additional bureaucracy resulting from compliance requirements associated with the LMS had resulted in a loss of control over their classes. Administrators/institutional heads now have a big influence on classroom activities due to quality assurance purposes restricting lecturer autonomy and flexibility, a view also shared by Coates et al (2005). As a result, some lecturers simply refused to comply with diktats relating to LMS use and were resistant to change, expressing disapproval of the manner in which the LMS was introduced. We can see some evidence of Dori et al's (2002) categorization of teachers in the varied responses from different groups of lecturers.

Administrators

Echoing findings in the literature (e.g. Hanon and D'Netto 2007, Berking and Gallagher 2014), the LMS also had significant ramifications for administrative practices at the University. In this section we will discuss some of the findings from the focus groups with administrative staff.

Exams Department

There was general support for the LMS as it introduced some efficient work practices such as computerized examination scheduling and grade entry. According to a supervisor: "the reports issued by the LMS highlights outstanding grades, automates grade entry, indicates when grades are entered and provides lecturers' compliance." Another noted: "the LMS has significantly reformed the department's

processes and procedures resulting in clerical and front-line staff being able to run reports", which in turn eased their work. However, echoing Linstead et al (2009), there were also comments highlighting power struggles and resistance to change to revamped roles. For instance, one employee noted: "the department has been affected by staff being transferred to other units and all staff members are now required to execute and have some form of interaction with the LMS."

Registry Department

The Registry team overwhelmingly hailed the adoption of the LMS and some of the key differences in pre- and post-adoption practices cited in the focus groups are shown in table 6 below.

Prior to the LMS	**After the LMS**
Course Registration done manually with extensive paperwork	Course Registration done electronically
Unstructured and unsystematic registration process driven by dates written on forms	Enables students to auto-enrol by the end of the registration period
Processing of pre-requisite overrides were sluggish and slow	Expeditious processing of pre-requisite overrides through defined and analytic reports provided by the LMS
Graduation and eligibility checks were manual with extensive use of manpower	Graduation and eligibility checks are now automated
Access to the company's data resources were accessible only on campus	Provides remote administration from outside the enterprise via the web based system
Limited computer training offered to staff members with educational technology; only Microsoft Word, Excel were utilized	Extensive training with LMS usage and retraining/refresher exercises are facilitated when there are modifications. Roles and responsibilities have been altered.
Students are added to module and then corrective measures are enacted after to confirm registration	Students are placed on waitlists if classes are full and the Registry would receive an automatic notification

Table 6 Changes in processes before and after LMS adoption

The accessibility, expediency, training, increased efficiency and automation of processes were all seen as benefits, but resistance to change and amended job descriptions with enlarged job functions were also cited as problems.

Accounts Department

This department also embraced the LMS as it enabled increased billing options through online payments. With this feature, students can be immediately transferred from 'unregistered' to 'registered', which grants unlimited access to resources. It was noted that persons overseas could now make online payments for their relatives without the complication of sending banks drafts or sending the money directly to the student to make payment.

Academic Affairs

Similar to lecturers, academic affairs coordinators displayed varying levels of enthusiasm for the LMS. The specialist administrators in Kingston felt that the LMS' influential and scalable architecture facilitates the management of workflow, development and delivery of course content and enhanced communication. The generalist administrators in Mandeville and Montego Bay lauded these functions, but argued that given their intermediary role for all departments, the additional workload generated by the LMS is not commensurate with their salary and benefits package. Nevertheless they all found the LMS useful for administering electronic surveys to students and collating feedback. Increased control over academics was clear in their use of the LMS to monitor content uploaded by lecturers and to monitor access by staff and students.

Information Technology Department

The adoption of the LMS transformed the administrative and operational functions of the IT department. In addition to their normal duties, they now had to train all groups on the new LMS and offer support, create documentation for training, define access controls, ensure availability and integrity of the LMS, and ensure security. With increased responsibility, there was also the accompanying job enrichment and enlargement of functions and the addition of new staff members to re-skill the department with content developers, help desk and system administrators. The LMS led to new, intertwined relationships between instructors, course administrators and the IT department. But this also led to complexity and challenges in dealing with new demands from staff and students alike.

Overall, while administrative staff across departments felt a variety of benefits, they also complained about increasing workload, loss of authority and change management challenges.

Conclusion

Drawing on the University's experience of the adoption of a new LMS, this paper examined the multifaceted impacts of the new technology on pedagogical and administrative practice. It did so using extensive data from focus groups with academic and administrative stakeholders, a survey of students and in-class observations. Woven throughout this analysis are the benefits accrued to various groups of stakeholders such as cost reduction, improved efficiencies, increased student engagement, expedited administrative tasks, improved educational content delivery and greater accessibility. On the contrary, attitudes and practices of lecturers, students and administrative staff, varying e-maturity, remuneration and additional workload are all constraints on LMS use.

The findings presented here highlight the dual impact of LMS on pedagogical practice and administration. Where it can enhance access and offer flexible modes of learning, it can also be used to limit access to particular students through defined control mechanisms and create a 'dumping' mentality in relation to learning resources. Improved administrative capabilities and efficiencies should also be seen in the light of new forms of control and monitoring of previously 'free' and flexible academic practice in the name of quality assurance. Thus LMS implementations need to take account of the inherent tensions between management processes and academic practice.

The findings here can be used to formulate intervention strategies aimed at advancing and streamlining the operations of similar institutions embarking on LMS adoption and use. A striking result is the limited usage of the interactive communication features of the LMS. Addressing this aspect can help create substantial benefits from peer tutoring, increased speed of feedback from lecturers and improved communication outside of the classroom setting. Understanding the contextual aspects of pedagogy, including the social interactions between teachers and students, and the different stakeholder views associated with the LMS will also help embed the use of LMS. However, our findings should be seen in the light of certain limitations: despite our efforts to obtain comparable data from multiple locations, the present findings are skewed towards Kingston because of the disproportionately large sample size from that location. With regards to methods, the current study used focus groups for academic and administrative stakeholders and a survey for students. Future studies could take a more balanced methodological approach. While we have made a start at exploring adoption of LMS by different stakeholders, it would be interesting, following Dori et al (2002) , to explore the characteristics of particular groups of adopters and their social dynamics in the context of adoption.

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Appendix A1 Focus Group Questions

The following questions were posited to both the administrators and the lecturers:

- How would you classify your adoption and uptake of the Learning Management System?
- What preparations were made before and after the implementation of the LMS?
- Was there a training exercise and if so, how did you perceive it?
- What are your perceptions of the LMS adoption and the interaction with administrators, lecturers and students alike?
- What are some of the benefits of the implementation of the LMS?
- What are some of the challenges faced with the LMS?
- What are some of the features of the LMS that you often use?
- How have your functions/roles changed since the implementation of the LMS?
- How would you compare the previous system (manual) with the LMS?
- What other features would add value to the existing LMS?

Appendix A2 Survey Instrument for Students

SECTION 1: DEMOGRAPHICS and GENERAL DETAILS

1) Program
2) Gender Male _____ Female_____
3) Age Group
   - 18-25 years
   - 26-33 years
   - 34-41 years
   - 42-49 years
   - 50 years and over
4) Which campus do you attend?
   - Kingston
   - Montego Bay
   - Mandeville
5) Which year are you in?
   - Sophomore (i.e. second year)
   - Third Year
   - Fourth Year
6) Which department are you in?
   - Business
   - Education
   - Professional Studies
   - Humanities
   - Information Technology
   - Languages and General Studies

SECTION 2: ADOPTION, USES AND EFFECTS OF THE LEARNING MANAGEMENT SYSTEM (LMS)

7) The Learning Management System was introduced in 2011, how has your department usage changed since its introduction?
   - The utilization of the LMS has increased significantly
   - The utilization of the LMS has increased slightly.
   - The utilization of the LMS has not changed
   - The utilization of the LMS has decreased slightly
   - The utilization of the LMS has decreased significantly
8) How would classify your adoption of the LMS in one of the following categories?
   - Innovators- this group is eager to adopt/try new technology
   - Early adopter- this group does not need much persuasion in adopting new technology
   - Early majority- this group is influenced by mainstream activities and the usage by other students and lecturers
   - Late majority- lingers until the LMS reaches a reputable standard
   - Laggards- resistant and slow to the utilization of LMS
9) How would you rate your lecturers' enthusiasm and usage of the LMS?
   - Excellent
   - Good
   - Average
   - Poor
   - Very Poor
10) Do you think your lecturers' usage and activities surrounding the LMS actually impacted on your use of the system?
   - The lecturers' utilization of the LMS has a major impact on my usage
   - The lecturers' utilization of the LMS has a minor impact on my usage
   - The lecturers' utilization has no impact at all
11) What are the benefits of the Learning Management System to teaching and learning?
12) What are some of the problems faced with the Learning Management System?
13) As a student, how has your engagement with the Learning Management System changed over the years?
   - Student engagement has increased significantly
   - Student engagement has increased slightly
   - Student engagement has not changed
   - Student engagement has decreased slightly
   - Student engagement has decreased significantly
14) How has your learning been impacted with the implementation of the Learning Management System?

- Student learning has been impacted significantly and positively
- Student learning has been impacted significantly and negatively
- Student learning has been impacted slightly and positively
- Student learning has been impacted slightly and negatively
- Student learning remains the same

15) How have the quality of teaching and the provision of educational resources (PowerPoint slides, videos, files) changed with the introduction of the LMS?

- There has been a significant positive change
- The has been a significant negative change
- There has been a slight positive change
- There has been a slight negative change
- There has been no change

16) How would you rate the responses of tutors to your messages using the Learning Management System?

- Excellent
- Poor
- Very Good
- Very poor
- Acceptable
- N/A

17) The LMS has reduced the access barriers to instructional and institutional resources?

- Strongly agree
- Disagree
- Agree
- Strongly disagree
- Undecided

18) How effective are the educational resources provided on the Learning Management System?

- Very effective
- Not very effective
- Fairly effective
- Not at all effective
- Neither effective nor ineffective

19) How often do technical difficulties occur within a one month time frame?

- 1-4 times
- 15times and over
- 5-9 times
- Never
- 10-14 times

20) How do technical difficulties (systems maintenance and access issues) impact on the teaching received and your learning?

- Technical difficulties have resulted in major disruptions to teaching and learning
- Technical difficulties have not disrupted teaching and learning
- Technical difficulties have resulted in minor disruptions to teaching and learning

21) How easy is it to access educational resources (PowerPoint slides, videos, files) using the LMS?

- Very Hard
- Easy
- Hard
- Very Easy
- Neither easy nor hard

22) How did you learn how to use the LMS?

- Through my lecturers
- Found out on my own
- Training Manuals
- Online help functions
- IT/Helpdesk Staff
- I still have not learnt
- Fellow students

23) How would you rate the training or materials received for the utilization of the Leaning Management System?

- Very satisfied
- Dissatisfied
- Satisfied
- Very dissatisfied
- Neutral

24) How many times per week do you utilize the LMS?

- I don't use the LMS weekly
- 4-6 times per week
- I don't use the LMS at all
- 7-9 times per week
- 1-3 times per week
- Over 10 times

Section 3: STUDENT ENGAGEMENT

25) How would you classify the frequency to which you utilize the LMS for the following features:

A) Course Evaluations

- All the time
- Often
- Fairly often
- Rarely
- Never

B) Communicate with your lecturers

- All the time
- Often
- Fairly often
- Rarely
- Never

C) Communicate with administrators

- All the time
- Often
- Fairly often
- Rarely
- Never

D) Communicate with fellow students

- All the time
- Often
- Fairly often
- Rarely
- Never

E) Upload assignments for grading

- All the time
- Often
- Fairly often
- Rarely
- Never

F) Checking grades

- All the time
- Often
- Fairly often
- Rarely
- Never

G) Use of discussion forums

- All the time
- Often
- Fairly often
- Rarely
- Never

H) To register for classes

- All the time
- Often
- Fairly often
- Rarely
- Never

I) Downloading and accessing resources

- All the time
- Often
- Fairly often
- Rarely
- Never

SECTION 4: ORGANIZATIONAL CHANGE

26) How has your role as a student changed since the adoption of the LMS?

27) In what way has your satisfaction rating of the institution been affected since the implementation of the LMS?

- My satisfaction rating has changed significantly in a positive way
- My satisfaction rating has changed slightly in a positive way
- My satisfaction rating has changed significantly in a negative way
- My satisfaction rating has changed slightly in a negative way
- My satisfaction rating has not changed

28) How does the LMS impact on your dealings with the following departments? Academic Affairs, Registry, Accounts/Finance, IT Department.

29) What are your views on the organizational changes that have taken place since the adoption of the LMS?

30) What areas would you like to see improve in the utilization of the LMS.

Appendix A3 Supporting Statistics

Cross Tabulation for Kingston	Adoption					
Age Group	Innovator	Early adopters	Early majority	Late majority	Laggards	Total
18-25 years	17	26	50	5	22	120
Row %	14.17%	21.67%	41.67%	4.17%	18.33%	100%
Column %	34.69%	29.55%	27.78%	50.00%	37.93%	31.17%
Total %	4.42%	6.75%	12.99%	1.30%	5.71%	31.17%
26-33 Years	11	22	41	3	7	84
Row %	13.10%	26.19%	48.81%	3.57%	8.33%	100%
Column %	22.45%	25.00%	22.78%	30.00%	12.07%	21.82%
Total %	2.86%	5.71%	10.65%	0.78%	1.82%	21.82%
34-41 years	7	21	34	1	16	79
Row %	8.86%	26.58%	43.04%	1.27%	20.25%	100.00%
Column %	14.29%	23.86%	18.89%	10.00%	27.59%	20.52%
Total %	1.82%	5.45%	8.83%	0.26%	4.16%	20.52%
42-49 years	13	14	42	1	9	79
Row %	16.46%	17.72%	53.16%	1.27%	11.39%	100%
Column %	26.53%	15.91%	23.33%	10%	15.52%	20.52%
Total %	3.38%	3.64%	10.91%	0.26%	2.34%	20.52%
50 years and over	1	5	13	0	4	23
Row %	4.35%	21.74%	56.52%	0.00%	17.39%	100%
Column %	2.04%	5.68%	7.22%	0.00%	6.90%	5.97%
Total %	0.26%	1.30%	3.38%	0.00%	1.04%	5.97%
Total	49	88	180	10	58	385
Row %	12.73%	22.86%	46.75%	2.60%	15.06%	100%
Column %	100%	100%	100%	100%	100%	100%
Total %	12.73%	22.86%	46.75%	2.60%	15.06%	100.00%

Chi-Square tests			
Statistic	Value	df	Asymp. Si. (2-tailed)
Pearson Chi Square	15.99	16	0.45
Likelihood Ratio	17.46	16	0.36
Linear-by-Linear Association	0	1	0.97
N	385		

Table A3.1 Cross tabulations for Kingston

Table 15: Cross Tabulations for Mandeville	Adoption					
Age Group	Innovators	Early adopters	Early majority	Late majority	Laggards	Total
18-25 years	6	8	4	0	0	18
Row %	33.33%	44.44%	22.22%	0.00%	0.00%	100%
Column %	100%	100.00%	44.44%	0.00%	0%	52.94%
Total %	17.65%	23.53%	11.76%	0.00%	0.00%	52.94%
26-33 Years	0	0	5	3	1	9
Row %	0.00%	0.00%	55.56%	33.33%	11.11%	100%
Column %	0%	0.00%	55.56%	100.00%	12.50%	26.47%
Total %	0.00%	0.00%	14.71%	8.82%	2.94%	26.47%
34-41 years	0.00%	0.00%	0.00%	0.00%	3	3
Row %	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
Column %	0.00%	0.00%	0.00%	0.00%	37.50%	8.82%
Total %	0.00%	0.00%	0.00%	0.00%	8.82%	8.82%
42-49 years	0	0	0	0	2	2
Row %	0.00%	0.00%	0.00%	0.00%	100.00%	100%
Column %	0%	0%	0%	0%	25%	5.88%
Total %	0.00%	0.00%	0.00%	0.00%	5.88%	5.88%
50 years and over	0	0	0	0	2	2
Row %	0.00%	0.00%	0.00%	0.00%	100.00%	100%
Column %	0%	0%	0%	0%	25%	5.88%
Total %	0.00%	0.00%	0.00%	0.00%	5.88%	5.88%
Total	6	8	9	3	8	34
Row %	17.65%	23.53%	26.47%	8.82%	23.53%	100%
Column %	100%	100%	100%	100%	100%	100.00%
Total %	17.65%	23.53%	26.47%	8.82%	23.53%	100.00%

Chi-Square tests			
Statistic	Value	df	Asymp. Si. (2-tailed)
Pearson Chi Square	47.85	16	0.00
Likelihood Ratio	50.55	16	0.00
Linear-by-Linear Association	22.39	1	0.00
N	34		

Table A3.2 Cross tabulations for Mandeville

Cross Tabulations for Montego Bay	Adoption					
Age Group	Innovators	Early adopters	Early majority	Late majority	Laggards	Total
18-25 years	3	2	7	0	0	12
Row %	25.00%	16.67%	58.33%	0.00%	0.00%	100%
Column %	100%	100.00%	87.50%	0.00%	0%	48.00%
Total %	12.00%	8.00%	28.00%	0.00%	0.00%	48.00%
26-33 Years	0	0	1	4	0	5
Row %	0.00%	0.00%	20.00%	80.00%	0.00%	100%
Column %	0%	0.00%	12.50%	66.67%	33.33%	20.00%
Total %	0.00%	0.00%	4.00%	16.00%	0.00%	20.00%
34-41 years	0.00%	0.00%	0.00%	2	1	3
Row %	0.00%	0.00%	0.00%	66.67%	33.33%	100.00%
Column %	0.00%	0.00%	0.00%	33.33%	16.67%	12.00%
Total %	0.00%	0.00%	0.00%	8.00%	4.00%	12.00%
42-49 years	0	0	0	0	2	2
Row %	0.00%	0.00%	0.00%	0.00%	100.00%	100%
Column %	0%	0%	0%	0%	33.33%	8.00%
Total %	0.00%	0.00%	0.00%	0.00%	8.00%	8.00%
50 years and over	0	0	0	0	3	3
Row %	0.00%	0.00%	0.00%	0.00%	100.00%	100%
Column %	0%	0%	0%	0%	50%	12.00%
Total %	0.00%	0.00%	0.00%	0.00%	12.00%	12.00%
Total	3	2	8	6	6	25
Row %	12.00%	8.00%	32.00%	24.00%	24.00%	100%
Column %	100%	100%	100%	100%	100%	100.00%
Total %	12.00%	8.00%	32.00%	24.00%	24.00%	100.00%

Chi-Square tests			
Statistic	Value	df	Asymp. Si. (2-tailed)
Pearson Chi Square	39.91	16	0.00
Likelihood Ratio	43.45	16	0.00
Linear-by-Linear Association	16.11	1	0.00
N	25		

Table A3.3 Cross tabulations for Montego Bay

Correlations in Kingston			
		Department Usage	Quality of teaching and Provision of educational resources
Department Usage	Pearson Correlation	1.00	0.84
	Sig. (2-tailed)		0.00
	N	385	385
Quality of Teaching and provision of educational resources	Pearson Correlation	0.84	1.00
	Sig. (2-tailed)	0.00	
	N	385	385

Correlations in Kingston			
		Lecturers' Activities	Student Engagement
Lecturers' Activities	Pearson Correlation	1.00	0.91
	Sig. (2-tailed)		0.00
	N	385	385
Student Engagement	Pearson Correlation	0.91	1.00
	Sig. (2-tailed)	0.00	
	N	385	385

Table A3.4 Correlations in Kingston

Correlations in Mandeville			
		Department Usage	Quality of teaching and Provision of educational resources
Department Usage	Pearson Correlation	1.00	0.91
	Sig. (2-tailed)		0.00
	N	34	34
Quality of Teaching and provision of educational resources	Pearson Correlation	0.91	1.00
	Sig. (2-tailed)	0.00	
	N	34	34

Correlations in Mandeville			
		Lecturers' Activities	Student Engagement
Lecturers' Activities	Pearson Correlation	1.00	0.70
	Sig. (2-tailed)		0.00
	N	34	34
Student Engagement	Pearson Correlation	0.70	1.00
	Sig. (2-tailed)	0.00	
	N	34	34

Table A3.5 Correlations in Mandeville

Correlations in Montego Bay			
		Department Usage	Quality of teaching and Provision of educational resources
Department Usage	Pearson Correlation	1.00	0.94
	Sig. (2-tailed)		0.00
	N	25	25
Quality of Teaching and provision of educational resources	Pearson Correlation	0.94	1.00
	Sig. (2-tailed)	0.00	
	N	25	25

Correlations in Montego Bay			
		Lecturers' Activities	Student Engagement
Lecturers' Activities	Pearson Correlation	1.00	0.87
	Sig. (2-tailed)		0.00
	N	25	25
Student Engagement	Pearson Correlation	0.87	1.00
	Sig. (2-tailed)	0.00	
	N	25	25

Table A3.6 Correlations in Montego Bay