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Examining Academics' Perceptions on the Impact of Learning Management Systems on Students' Academic Performance: A Quantitative Research from South Africa*

Lubabalo MBANGATA[1][0000-0003-3036-7164] and Abdultaofeek ABAYOMI[2][0000-0003-3129-5246]

[1]Department of Information Systems, Durban University of Technology, Durban 4001, South Africa

[1]School of Management, IT and Governance, University of Kwazulu-Natal, Durban, South Africa

[2]Department of Information and Communication Technology, Mangosuthu University of Technology, Durban 4026, South Africa

Correspondence should be addressed to: Lubabalo MBANGATA, lubabalom1@dut.ac.za

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Abstract

The usage of e-Learning offers diverse benefits to students. However, the problematic academic fiasco and dropout are also very familiar in research studies; hence, the main aim of this current study is to scrutinize academics' perceptions on the influence of Learning Management Systems (LMS) on students' academic performance amongst this high academic fiasco and dropout rates especially in this e-Learning era despite all its advantages. The aim was achieved by following these objectives; (i) to design a theoretically sound model relating LMS and students' academic performance; (ii) to empirically evaluate the designed model; and (iii) to offer recommendations on improving the perceptions of academics on the impact of LMSs on students' academic performance. The content analysis method was utilized to review prevailing literature and to design the proposed model. Consequently, a survey of 78 academic staff from four public universities in South Africa was utilized to empirically test the designed model. The perceptions of academics on the impact of LMSs on academic performance are indirectly affected by the academics' gender, their type of employment (contract or permanent) and their ethnicity. In contrast, they are directly affected by their e-Learning attitude, computer self-efficacy, pedagogical beliefs, and their use of LMSs. This study concludes that academics' perceived impact of LMSs on academic performance could improve by augmenting academics' computer self-efficacy, their pedagogical beliefs, and their attitude towards LMSs.

Keywords: Learning Management System; Academic Performance; e-Learning, Content Analysis, University Education

Introduction

Utilising computing devices and technologies for teaching and learning has become a phenomenal trend in classrooms, and this process is regarded as e-Learning. It has also been defined as the use of electronic media for various learning purposes including add-on functions in traditional classrooms to full substitution for the face-to-face meetings through online engagements" (Guri-Rosenblit, 2006),. The use of these devices can be classified into three concepts: as an instrument for students to participate in online discussions or to communicate either peer-to-peer or peer-to-teacher both asynchronously or synchronously; as an instrument to create and distribute knowledge; and as an instrument for learning resources delivered (Gonzalez, 2010). The synchronous e-Learning happens in a real-time communication that depends on the simultaneous participation of the teachers and the students. Whereas asynchronous e-Learning happens in a form of interaction that does not warrants the teachers and the students to be together at a specific time and place to conduct teaching and learning activities. Johnson

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and Becke (2006) posits that asynchronous e-Learning takes place in a delayed time and it is not based on the concurrent involvement of students and teachers unlike in synchronous e-Learning.

Using e-Learning for teaching and learning offers different advantages to students. These include: i) flexibility as regards time and place; ii) the ease of access to a huge amount of information to improved value of knowledge and qualification; iii) facility of communiqué opportunities between students through discussion forums; iv) contemplation of discrete differences among students; v) bridging the gap for the shortage of academic staff, as well as instructors, teachers, facilitators, and lab technicians; and vi) individual-paced learning (Arforful and Abaidoo, 2015). Despite these advantages, there are also some disadvantages of using e-Learning which include over dependence on technology which might lead to unsatisfied teaching and learning if the teacher or the students lacks computer self-efficacy or technical skills especially in a synchronous e-Learning environment (Chauhan, 2017). Synchronous learning also raises the time zone trial as it may require either students or teachers to interact in different time zones. On the other hand, according to Chauhan (2017), asynchronous e-Learning requires a strong sense of self-discipline and self-motivation for teaching and learning because of the delayed communication between teachers and students. Moreover, in asynchronous e-Learning, students might require a deeper understanding of the subject matter before they can start to engage on the ongoing discussion (Jonson, 2006).

This paper is thus structured as follows: the problem statement is presented in Section 2 , and the methodology in Section 3. Section 4 presents the literature review and its findings, while Section 5 presents the design of the survey conducted in this study. Section 6 discusses the results of the survey, and Section 7 is the conclusion and recommendations.

Problem Statement

The problem of academic failure is well documented in the existing literature, be it in tertiary education, in secondary education or in primary education (Alyahyan and Düştegör 2020). The core problem investigated in this study examines the academics' perceptions of the impact of Learning Management Systems on students' academic performance amidst the high academic failure rate in the e-Learning era despite all its advantages. In fact, according to Holland and Galant (2016), some students in higher education, especially in medical schools, do encounter stumbling blocks by experiencing academic failure and will have to decide on whether to carry on their studies or not. Álvarez-González et al. (2017) state that about 12% of medical students per semester are exposed to the risks of exclusion due to their poor academic performance, and this academic failure can also result on waste of resources, time, and costs which at the end prime to reduced educational productivity. Al-Zoubi and Younes (2015:2264) mention that "the low academic achievement problem of students in examinations is a major problems that faces students as well as teachers". Hence, the current study aims to model factors that influences the perceptions of computing science academics on the impact of learning management systems on students' academic performance especially in this era of e-Learning.

Methodology

Two different methods were used which include content analysis using a systematic literature review technique to conduct the literature reviewed in this study, and the survey methodology is used to develop an excellent theoretical model of factors affecting computing academics' perceptions of the impact of learning management systems on academic performance especially in e-Learning era. These methods are hereby briefly discussed.

Content Analysis

This study followed the content analysis method proposed by Gaur and Kumar (2018) and it has the following steps: a) selection of databases for the content analysis; b) selection of the literature samples as part of the content analysis; c) development of the coding scheme of the content analysis; d) coding of the sample of the content analysis; e) analysis of the coding scheme's reliability; and f) the summary of the content analysis results as coded by the above-mentioned coding scheme. Our implementation of the steps is described as follows:

Database selection

The Google scholar as a major search engine was used for the selection of papers from different databases to be included in this study. The list of the literature databases includes: JMAS, Academia, Elsevier, Medical teacher, Taylor and Francis, ResearchGate, IEEE Xplore, ERIC, Wiley, Core, Jite, and Emerald.

Sample selection

Thereafter, the sample selection followed three-steps selection criteria: the first being the free availability of research papers based on the earlier-mentioned database selection strategy. The second criterion entails that the keyword "impact of e-Learning" or "academic performance" must be included, and its date of publication should be relatively recent. Finally, the applied content analysis only considered empirical studies.

Coding Scheme Development

The content analysis employed coded its selected studies in terms of their author(s), context and time intervals, theories, the research methodologies, data sources, types of data, sampling techniques, types of analysis, methods of analysis and the validity and reliability test methods. Table 1 indicates the variables used as V1, V2, V3, V4, V5, V6, V7, V8, V9, V10, V11, V12, V13, and V14, and their meanings. For example, in Table 1, row number one where V1 is 2, indicates that the study number is 2.

Table 1: Coding scheme of the variables and their meanings

Code	Variables	Code	Variables
V1	Study number	V8	Sampling techniques
V2	Context	V9	Type of analysis
V3	Time interval	V10	Method of analysis
V4	Theories and models	V11	Research variables
V5	Research method	V12	Validity
V6	Data source	V13	Reliability
V7	Type of data	V14	Key research findings

The Reliability of coding scheme

This intra-class correlation coefficient method was applied in this study to test the reliability of its content analysis by using two information technology postgraduate students that assessed the suitability or otherwise of the coding schemes in Table 1. The Cronbach's alpha (α) coefficients that were calculated for the assessment of the coding scheme's reliability of the content analysis conducted by this study is shown in Table 2 and 3, thus indicating the descriptive statistics of the content analysis presented. The value of the Cronbach's alpha (α) coefficient obtained is 0.726 and indicates the reliability of the coding scheme of the content analysis conducted by this study since the 0.726 value obtained is greater than 0.7 as required (Cocks *et al*., 2007).

Table 2: Descriptive statistics of the content analysis for studies used in literature view

		N	%
Cases	**Valid**	34*	100.0
	Excluded[a]	0	.0
	Total	34	100.0
*Number of literature studies utilised			

Table 3: Cronbach's coefficient of the content analysis for studies used in literature review

Cronbach's alpha coefficient	No of Items
.726	15

This study's content analysis' intra-class correlation coefficient is shown in Table 4.

Table 4: Intra-class correlation coefficient of the content analysis

	Intra-class Correlation	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.143[a]	.087	.226	3.500	53	742	.003
Average Measures	.726[c]	.589	.815	3.500	53	742	.003
Two-way mixed effects model where people effects are random and measures effects are fixed.							
a. The estimator is the same, whether the interaction effect is present or not.							
c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.							

Literature Review

The literature review of this study adopted the earlier-mentioned criteria for database selection and inclusion of relevant studies. The review found thirty-four (34) studies that met the criteria, with thirty-nine (39) different authors as main authors. There are five (5) varied continents (Africa, Asia, Australia, Europe, and North America) that were cited as the main context of the thirty-four (34) studies reviewed with twelve (12) studies (Owinoi, 2016; Conijn, 2016; Bas *et al*., 2013; and Merino and López, 2013) published between year 2013 and 2017, fifteen (15) studies (e.g., Dodd, 2009; Al-Saai *et al*., 2011; Islam, 2012; and Lee and Lee, 2008) between year 2008 and 2012, and seven (7) studies (Sharma, 2007; Eom, 2006; Yang and Tang, 2003; and McGill *et al*., 2008) between the year 2003 and 2007. Sixteen (16) of the reviewed studies (including Dodd, 2009; Al-Saai *et al*., 2011; Romero and Barbera, 2011; Lynch and Dembo, 2004; Michinov *et al*., 2010; and Crampton *et al*., 2012), did not state the theory or models they used to conduct their studies. Seven (7) of the studies (Al-Rahmi et al (2014); Islam (2015); Sharma (2007); Eom (2006); Johnson et al (2009); Bas et al (2013); and Al-Rahim and Othman (2013)) used a self-developed model, while four (4) studies (Chong, 2010; Galy *et al*., 2011; Islam, 2013; and Islam, 2012) used a technology acceptance-based model. Only 2 studies (Lee, 2009 and Lee and Lee, 2008) used Information Systems Success and Technology-to-Performance (McGill and Klobas, 2008 and McGill et al., 2008) respectively, while Self-Regulated Learning (Owinoi, 2016), Social Cognitive theory (Chang, 2014) and Perspective of Constructivism (Yu and Jo, 2014) were used by one study each respectively. Questionnaire and experiment were the most used research method mostly on students as data sources to collect either exceptional or experimental data. As for sampling technique that were used by the studies reviewed, Islam (2013), Al-Saai *et al*., (2011), Ladyshewsky (2004), and McGill *et al*., (2010) used random selection sampling technique with cross-sectional (Eom, 2006; Lee and Lee, 2008; Chong, 2010; and Lee, 2009) analysis type, and non-parametric (Chong, 2010; Lee and Lee, 2008; Ismal, 2015; and Sharna, 2007) and parametric (Regueras *et al*., 2009; Al-Rahim and Othman, 2013; Bas *et al*., 2013; Chang 2014; and Zacharis, 2015) methods of analysis.

In this review, we categorised the research variables into six groups including Demographics; Motivation and Pride; Intensity use of e-Learning; Self-Efficacy and Learning Approach; Perceptions on the Suitability of e-Learning; and Sense of Community and Interactivity. Studies such as (McGill and Klobas, 2008; Lee, 2009; Michinov et al., 2010; Galy et al., 2011; and Al-Saai et al., 2011;) used Cronbach's alpha coefficient for reliability test, while (Regueras et al., 2009; Owinoi, 2016; Al-Rahmi et al., 2014; and Al-Rahim and Othman, 2013) used Pearson's correlation coefficients or Discriminant (Islam, 2015; Islam, 2013; Islam, 2012; McGill and Klobas, 2008; and Eom, 2006) or Descriptive (Owston et al., 2012) statistics as the validity test. The main finding of this study's literature analysis indicate an inconclusive position on the influence of the variables: demographics, motivation and pride, and perceptions of students on the impact of e-Learning on academic performance. Also, we found that studies agree on the positive effect of the variables: intensity use of e-Learning, self-efficacy and learning approach, and sense of community and interactivity on the perceptions of students on the impact of e-Learning on academic performance.

Theoretical Model

Taking into consideration the fact that some of those relationships among variables and their impacts with respect to e-Learning on academic performance were not categorically substantiated in the analysis of literature , it is essential to consider whether, or not they can be explained by existing theories. A theoretical model as shown in

Figure 1, illustrates the factors that are impacting users' perceptions on the effect of e-Learning on academic performance as we consider debating the rationalization by existing theories. The model shown in Figure 1 is one of the major contributions to body of knowledge by this study. The model is designed based on the factors that were founded to affect students' academic performance in content analysis discussed above and it will be later on be empirically tested.

The effect of students' demographics and their intensity of use of e-Learning on their academic performance is endorsed by the Walberg's theory of education (Walberg, 1984). Comparably, the effect of students' motivation and pride on their academic performance is supported by the Self-Determination theory (Kusurkar *et al*., 2013) while their self-efficacy and learning approach as endorsed by self-regulated theory (Lee and Lee 2008) have effects on academic performance. Likewise, the correlation between student perceptions on the suitability of e-Learning and their academic performance in the e-Learning context aligns with the Task Technology Fit theory (Staples and Seddon, 2004). Lastly, the students' sense of community and interactivity, and their academic performance correlation is supported by the Social Constructivism theory (Yu and Jo, 2014).

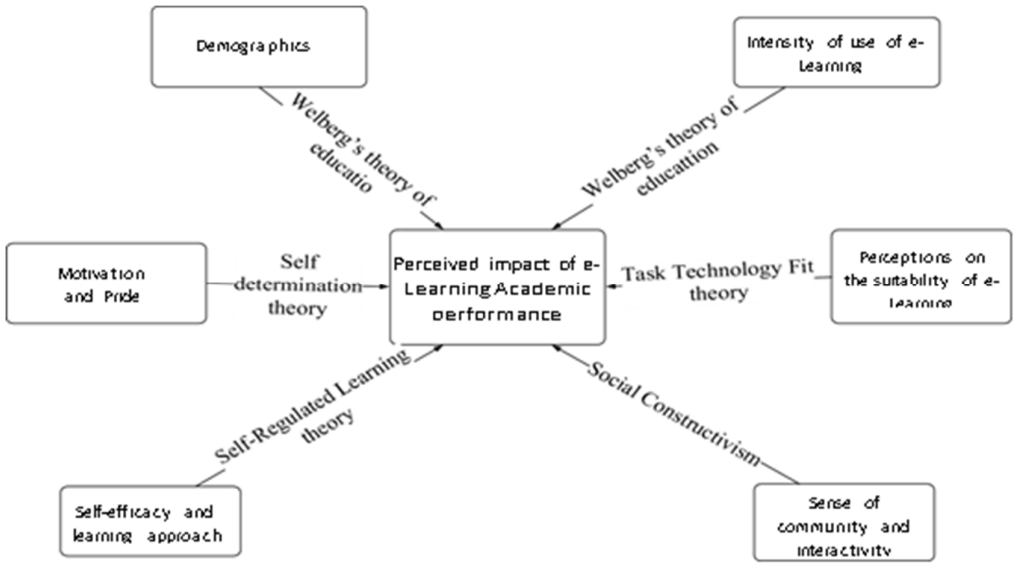

Figure 1. A proposed theoretical model of factors that are affecting perceived impact of e- Learning on academic performance

Walberg's theory of educational productivity (1981) and Walberg's theory (1984) suggests nine aspects which leads to adjustments in students' cognitive and affective outcomes. These include age or phase of age; capability or prior achievement; the peer group outside school; the home; motivation or self-concept; value of the instructional experience; the classroom social group; amount of time; and the use of time outside school. These elements have an effect on one another, and are also affected by the learner's academic performance (Walberg, 1984). Five key factors including motivation, capability, amount of time, age, and value of the instructional experience have been identified as essential for students' capability to learn (Walberg, 1984). This was also validated by the educational model from Benjamin Bloom (1968).

However, the Self-Determination theory (SDT) supports that the further self-determined, self-motivated, and self-directed are students, the further advanced are their academic performance, their regulation, and their general well-being (Kusurkar *et al*., 2013). SDT regard the value of motivation to be extra significant than its quantity. According to Black and Deci (2000), SDT posits that driven behaviours are either self-sufficient or regulated. Self-sufficient behaviours have an inner drive; they are normally centred on past encounters, and they are acted from individual interest. Divergently, controlled behaviours are triggered by outer influences, and they are felt as being compelled by interpersonal needs, such as the impression that one has to accomplish high scores to be deemed of valuable individual.

Social Constructivism is a major theory for learning technology (Yu and Jo, 2014). It views learning as a self-developing process by creating or reorganizing a concept or cognitive structure", and applying learners' encounters and philosophies. Dagar and Yadav (2016) posit that Social Constructivism as an epistemological

context of knowledge acquisition, in which "social interaction plays a crucial role in the learning process". Social constructivism concentrates both on the knowledge environment and on learners' proficiency to self-reflect on topic in quest. It suggests that knowledge acquisition take place as a result of the imitation of prior encounters by learners, and by reason of their physical, cultural, and societal settings. Social constructivists consider that schooling and knowledge acquisition are conditioned by self-reflection and by self-understanding. In social constructivism, learners are more engaged in the teaching procedure because knowledge acquisition depend on more personal encounters. The constructivist position of learning proposes that knowledge is individually formed and socially constructed by a learner during his or her contact both with the world and with the learning subject matter.

According to Goodhue and Thompson (1995), the Task-Technology Fit Theory (TTFT) posits that users' performance are influenced by information systems subject to the fit amongst the users' task needs and the functionality of the system. In addition, TTFT as viewed by Staples and Seddon (2004), also implies that the effect on users' performance rely on the fit of the functionality of the system and the personal characteristics of the users and. The base line of the task-technology theory is that the performance of a technology and its application precisely depend on how it fits with the task at hand.

On its own, the Self-Regulated Learning Theory (SRLT) suggests that learners should hold some self-regulatory qualities in order to accomplish. Lee and Lee (2008) suggest that self-regulated learners are those who consider an active liability for their own knowledge acquisition and for their academic achievement. Self-regulatory learning is a learner's deliberate endeavour for subject learning. It is a regular management process involving one's own ideas, sensations, and behaviour for his or her individual goals and accomplishments (Schunk and Ertmer, 2000). In the SRLT, ambitious students exhibit a high level of endeavour and dedication, they create a high level of curiosity in their learning, as well as a high level of self-confidence to learn how to attain their tasks (Schunk, 1986).

Survey Design

The survey's methodology utilised in this research is centred on the recommendation proposed by Peng *et al*. (2011), that surveys are used to validate or empirically test proposed research theoretical framework.

Generally, surveys are utilised for data collection for various goals, from quest to comprehend the viewpoint of the studied populations, their opinions and/or their behaviours. Fan *et al*. (2015) suggest that surveys are mainly utilised when gathering data on sensations whose experimentations cannot be directly conducted. The following segment will provide the survey that was achieved by this study with regards to its sample size, population, and sampling method, research instrument - its reliability, validity and method analysis.

Research Population

The sampled population of this current study consist of academic staff of computing science departments of some selected KwaZulu-Natal Province universities, South Africa consisting of Durban University of Technology (DUT), Mangosuthu University of Technology (MUT), University of KwaZulu-Natal (UKZN), and University of Zululand (UniZulu). The population sizes for the various computing departments of the selected universities are shown in the Table 5.

Table 5: Population of survey in the sampled universities

University Name	Computing Department	Population Size
DUT	Information Technology	47
MUT	Information and Communication Technology	21
UKZN	Computer Science	9
	Information Systems and Technology	17
UniZulu	Computer Science	8
		N = 102

Sampling Method

The sample size computed for this study comprised of seventy-eight (78) academic staff from the stated research population. The random stratified sampling method was applied to select the sample size of this study.

Stratified sampling involves partitioning the objects of the study into groups or partitions with equal variables (Podgurski *et al*. 1999). The calculation of the sample size was as presented in the Equation (1) Naing *et al*. (2006).

$$n = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)}$$

where n = sample size; N = population size equal to 102, Z = confidence level equal to 1.96 to align with 95% confidence intervals (CI), and the investigator who want to be more confident (say 99%) about their estimates, the value of Z is set at 2.58; P = estimated proportion equal to 70%; and d = precision/acceptable margin of error equal to 0.05.

The stratification of this sample was done, as shown in Table 6 using the different university computing departments as strata.

Table 6: Sampling of participants by universities' computing departments

Universities Computing Department	**Population Size**	**Population Proportion**	**Sample Size**
DUT Information Technology	47	(47/102) = 46%	46%*78=36
MUT Information Technology	21	(21/102) = 21%	21%*78=16
UKZN Computer Science	09	(09/102) = 9%	9%*78=7
UKZN Info. Systems and Tech.	17	(17/102) = 17%	17%*78=13
UniZulu Computer Science	08	(08/102) = 7%	7%*78=6
Totals	102	100%	n = 78

Research Instrument and Scales

The primary research instrument of the survey is its questionnaire which was centred around the theoretical model presented in Figure 1. The questionnaire was advanced and administered by the researchers and it comprises the following five Likert- scale (Strongly Agree, Fairly Agree, Weakly Agree, Fairly Disagree, and Strongly Disagree) (Bertram, 2013) with the following variables: A) Demographics; B) Attitude towards e-Learning; C) Computer self-efficacy; D) Pedagogical beliefs; E) Use of LMSs; and F) Perceived impact of LMSs on academic performance. A brief description of these six research variables is hereby presented.

Demographics: Relevant data was collected from the participants regarding the following eight (8) biographical items: citizenship; racial category or ethnic group; gender; academic institution; academic rank; age range; academic department; and employment status. The various preferences for these eight biographical items can be noticed on the questionnaire in Appendix A.

Attitude Towards e-Learning: This study defines attitude according to Kind *et al*., (2007), who posit that attitude is "feelings that a person has about an object, based on their beliefs about that object". Participants were, therefore, asked to give data on their feelings and opinions on the capability of e-Learning to eliminate tedious work; create quality jobs; improve academic performance; bring fun to teaching and learning; reduce copying and cheating; create communication channels; make learning easer; and reduce the cost of education. Some of these items were inspired by the attitudes' scales from Kay (1990), Christensen and Knezek (1996), Durndell and Haag (2002), Mishra and Panda (2007).

Computer Self-Efficacy: This study defines computer self-efficacy according to the definition of Bandura (1986) and Compeau and Higgins (1995) who perceive it as one's reasoning on his or her ability to master the utilisation of computing devices. Participants, therefore, gave data on their judgement of their abilities to master the utilisation of computing devices in terms of understanding computer terminology; learning new computer tasks through trial and error; typing fast on (mobile) computing devices; troubleshooting common computer programs; using common computer programs; learning new computer tasks with manual references; and using computer

programs to analyse data. These questionnaire items are inspired by the computer self-efficacy scale suggested by Torkzadeh and Koufteros (1994).

Pedagogical Beliefs: This study defines teachers' pedagogical beliefs according to Ertmer's (2005) definition, who perceive them as teacher's "educational beliefs about teaching and learning". Participants were, thus invited to give data on their educational beliefs on the constructivist aptitudes of students by asserting whether or not they suppose that students have the self-ability to: share knowledge; experience, and ideas; self-improve their academic performance; self- improve their thinking; adapt acquired knowledge to different contexts; relate educational knowledge to their daily life; analyse situations from different perspectives; take responsibility for their learning; and discover relevant strategies for new problems. These questionnaire items are inspired by the pedagogical beliefs' scale suggested by Obafemi (2015: 102).

Use of LMSs: This study defines the use of LMSs according to Llamas *et al*. (2011) who posit that use is an extent to which learners use the system functionalities in their learning process. Participants were consequently invited to give data on their usage of LMSs with regards to discussions on teaching and learning issues; the uploading of video and audio-based teaching resources; the conduct of live interactive teaching; : the uploading of text based teaching resources; the broadcasting of messages; the exchange of individual messages; the conduct of assessments; participation in academic newsgroups; the downloading of students' submissions; and the setting-up of time management tasks. The questionnaire items are inspired by the LMSs' usage scale suggested by Mahdizadeh (2007).

Perceptions on the Impact of LMSs on Academic Performance: This study defines perceptions according to Da Silva's (2005:10) and Lara Herrera (2015:109), as "a physical and intellectual ability used in mental processes to recognize, interpret, and understand events". Participants stated whether or not they consider that LMSs can advance students' academic performance by helping them to adapt existing solutions to different domains or ranges; implement a given design into a solution; present or explain a solution to others model, illustrate, and create an abstraction for a solution; analyse the complexity of existing solutions; apply existing solutions to different contexts; design and devise solutions to different problems; recognise the base knowledge and vocabulary of different subject matters; debug, detect, and correct flaws in existing solutions; and refactor, redesign, and optimise a solution. These questionnaire items are inspired by perception scale suggested by Carvalho *et al*. (2011), and McGill and Klobas (2009).

Analysis Methods

The validity and reliability of the questionnaire was first examined by means of Cronbach Alpha coefficients as shown in Table 7. Thereafter, its data were analysed using the SPSS package. The data of the above-described questionnaire were scrutinised both descriptively and inferentially in terms of frequencies and means analysis, and inferential analysis. The inferential analysis was conducted in the form of the computation of Pearson's correlation coefficients between the different variables of the questionnaire, and, subsequently, linear regression equations were computed for the variables with positive Pearson's correlations. All the above stated tests were achieved with a level of confidence of 95% in conjunction with a significant p-value between 0.00 and 0.05.

Results And Discussion

This section presents the results of the survey in terms of instrument's reliability and validity, descriptive statistics, inferential statistics (correlations), and empirically tested model.

Data Reliability and Validity

The instrument's reliability was tested, and the result obtained is shown in Table 7 indicating the Cronbach's alpha (α) coefficients attained for the testing of the dependability of the questionnaire tool of this study including the Pearson coefficients attained for testing its validity. The values of all the Cronbach's alpha (α) coefficients are comparatively greater than 0.7.

Table 7: Data reliability for research variables

Research Variable	No. of Items	Cronbach's Alpha
Attitude Towards e-Learning	8	.846
Computer Self-Efficacy	8	.915
Pedagogical Beliefs	8	.945

Use of LMSs	10	.877
Perception on the Impact of LMSs on Academic Performance	10	.961

Table 8: Data validity for research variables

Research Items for Research Variables	Attitude	Self-efficacy	Pedagogical beliefs	LMS Use	Academic Performance
Item 1	0,698	0,857	0,781	0,604	0,846
Item 2	0,791	0,824	0,881	0,742	0,849
Item 3	0,691	0,885	0,859	0,674	0,86
Item 4	0,669	0,756	0,856	0,759	0,901
Item 5	0,756	0,65	0,862	0,609	0,899
Item 6	0,73	0,861	0,812	0,769	0,896
Item 7	0,631	0,83	0,875	0,802	0,848
Item 8	0,639	0,771	0,884	0,657	0,877
Item 9	-	-	-	0,726	0,765
Item 10	-	-	-	0,634	0,86
Mean	**0,700**	**0,804**	**0,851**	**0,697**	**0,860**
NB: the – means that there is no question relating to the item number					

This evidently point out that the questionnaire utilised in this study is dependable. The instrument's validity was tested for convergent validity of its items according to the values of Person correlation coefficients (r) against their scale. The items refer to the questions asked relating to each of the research variables to understand academics' perceptions. The Pearson correlation coefficients (r) amongst each research variable scale and their corresponding research items are greater than 0.4 as shown in Table 8, which implies that the research variable scales of this study are valid.

Descriptive Statistics

The mean, frequency and other statistics descriptive of the various research variables utilised in this study are presented in Table 9 starting with the demographics. The results are interesting showing that there were fairly more male respondents (59%) than female counterparts (41%). Most of the respondents' ages ranged between 30 and 60 years old with the fair number of the respondents counted as fairly young academics aged between 30 and 40 (44.9%). A majority by half of the participants were Black race and roughly a third of them were Indians origin (29.5%). More than two thirds of the respondents were permanent employees (71.8%), and nearly the same ratio of academics were South African citizens (70.5%). A great margin of academic staff was from Information Technology departments (83.3%) and nearly half of respondents had the position of lecturer (47.4%).

According to the mean values as shown in Table 10, the ability of e-Learning to reduce copying and cheating (Item B4) was rated the lowest by the participants in this study (2.63 out 5). Conversely, the ability of e-Learning to create many communication channels in academia (Item B7) was rated highest by the participants (4.36 out of 5). The mean values obtained thus indicate that, on the average, the overall benefits of e-Learning are rated as being slightly above average by the participants of this study (3.5497 out of 5).

Furthermore, according to these mean values on the computer self-efficacy of the participants in this study in terms of their ability to learn new computing trends are shown in Table 11.

Table 9: Descriptive statistics for demographics of respondents

Demographics Items		Percentage (%)
Institution	DUT	46.2
	MUT	20.5
	UKZN	25.6
	UNIZULU	7.7
Department	IT	83.3
	CS	16.7

Age	U30 years	11.5
	30 – 40 years	44.9
	41 – 50 years	17.9
	51 – 60 years	20.5
	Above 60 years	5.1
Gender	Female	41
	Male	59
Ethnic Group	Black	50
	Coloured	3.8
	White	14.1
	Indian	29.5
	Prefer Not to Say	2.6
Employment Type	Permanent	71.8
	Contract	28.2
Citizenship	South African	70.5
	Expatriate	24.4
	Prefer Not to Say	3.8
Rank	Junior Lecturer	16.7
	Lecturer	47.4
	Senior Lecturer	17.9
	Associate Professor	9
	Full Professor	1.3
	Other	7.7

Table 10: Descriptive statistics of academics' perceptions towards e-Learning

Descriptive Statistics				
Item	**Min**	**Max**	**Mean**	**Std. Deviation**
B1	1	5	3.83	1.037
B2	2	5	3.88	.939
B3	1	5	3.47	1.003
B4	1	5	2.63	1.141
B5	1	5	3.77	.952
B6	1	5	3.00	1.117
B7	2	5	4.36	.868
B8	1	5	3.45	1.265
B	1.75	4.88	3.5497	.72673

In general, in this study, the participants highly rated their computer self-efficacy, such that even the lowest-rated computer self-efficacy item, i. e. the ability to learn new computer tasks with the help of reference manuals (Item C5), was given a mean value of 4.08 out 5.

In Table 12, the mean values of the pedagogical beliefs of the participants of this study on students' self-ability to learn on their own are shown. Based on these mean values, learners' self-ability to discover relevant strategies for new problems (Item D8) recorded the lowest rating by the participants (3.44 out 5). In addition, learners' self-ability of sharing knowledge, experience, and ideas with others (Item D1) has the highest rating by the participants of this study (4.18 out of 5). These mean values thus suggest that, on the average, learners' self-ability was rated as being slightly above average by the participants of this study (3.6843 out of 5).

Table 11: Descriptive statistics for computer self-efficacy of academics learning new computer trends

Descriptive Statistics				
Item	**Min**	**Max**	**Mean**	**Std. Deviation**
C1	1	5	4.36	.852
C2	1	5	4.12	.967
C3	1	5	4.45	.832
C4	2	5	4.24	.942
C5	1	5	4.08	1.066
C6	1	5	4.31	.902
C7	2	5	4.55	.658
C8	2	5	4.40	.795
C	1.75	5.00	4.3125	.70040

These mean values also indicate that, on the average, the overall use of LMSs by the participants of this study can be rated as above average (3.8308 out of 5).

Table 12: Descriptive statistics for pedagogical beliefs of academics on students' self-ability to learn on their own

Descriptive Statistics				
Item	**Min**	**Max**	**Mean**	**Std. Deviation**
D1	2	5	4.18	.879
D2	2	5	3.82	.879
D3	1	5	3.67	1.002
D4	1	5	3.58	1.000
D5	2	5	3.65	.978
D6	1	5	3.56	.988
D7	1	5	3.58	.987
D8	1	5	3.44	1.112
D	1.63	5.00	3.6843	.83373

Accordingly, Table 13 presents the mean values on the use of LMSs by the sampled participants of this study. Based on these mean values obtained, the participants in this study acknowledge that the conduct of live interactive teaching (Item E3) is the LMS feature that they use less (2.85 out 5). On the other hand, the participants in this study acknowledge that the broadcasting of messages to students (Item E5) is the LMS feature that they use most (4.54 out of 5).

Table 13: Descriptive statistics for use of LMSs by academics

Descriptive Statistics				
Item	**Min**	**Max**	**Mean**	**Std. Deviation**
E1	2	5	4.53	.716
E2	1	5	3.79	1.262
E3	1	5	2.85	1.460
E4	1	5	4.21	1.085
E5	2	5	4.54	.715
E6	1	5	3.83	1.242
E7	1	5	3.86	1.203
E8	1	5	4.18	1.066
E9	1	5	3.23	1.338
E10	1	5	3.29	1.349
E	1.60	5.00	3.8308	.80587

Table 14 indicates the mean values obtained on the perceptions of the participants on the impact of LMSs on academic performance. These mean values revealed that the study's respondents are of the opinion that LMSs have a slightly positive impact on academic performance.

Table 14: Descriptive statistics for academics' perception on impact of LMSs on students' academic performance

Descriptive Statistics				
Item	**Min**	**Max**	**Mean**	**Std. Deviation**
F1	1	5	3.49	1.125
F2	1	5	3.31	1.023
F3	1	5	3.38	1.047
F4	1	5	3.23	1.068
F5	1	5	3.42	1.051
F6	1	5	3.44	1.064
F7	1	5	3.41	1.074
F8	1	5	3.54	1.053
F9	1	5	3.68	1.075
F10	1	5	3.33	1.065
F	1.00	5.00	3.4231	.91565

Pearson Correlation Test Results

The Pearson correlation results of each research variable against the other Likert-scale research variables of this study, with a significant level of 0.05 (one star*) and with significant level of 0.01 (two stars **) are shown in Table 15. These results revealed the inter-correlation by Pearson correlations of all the Likert-scale variables utilised in this current study .

Table 15: Correlation table of research variables (excluding demographics)

		Attitude	**Self-Efficacy**	**Pedagogical**	**Use of LMSs**	**Academic Performance**
Attitude	**Pearson Correlation**	1	.264*	.522**	.606**	.644**
	Sig. (2-tailed)		.019	.000	.000	.000
	N	78	78	78	78	78
Self-Efficacy	**Pearson Correlation**	.264*	1	.354**	.301**	.301**
	Sig. (2-tailed)	.019		.001	.007	.007
	N	78	78	78	78	78
Pedagogical	**Pearson Correlation**	.522**	.354**	1	.559**	.560**
	Sig. (2-tailed)	.000	.001		.000	.000
	N	78	78	78	78	78
Use of LMSs	**Pearson Correlation**	.606**	.301**	.559**	1	.581**
	Sig. (2-tailed)	.000	.007	.000		.000
	N	78	78	78	78	78
Academic Performance	**Pearson Correlation**	.644**	.301**	.560**	.581**	1
	Sig. (2-tailed)	.000	.007	.000	.000	
	N	78	78	78	78	78
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

The results of the varied inferential statistical analysis performed in this study can be summarised by the empirically tested model of the factors that are affecting the perceptions of computing academics on the impact of LMSs on academic performance. However, this study discover other relationships amongst its variables, as indicated on the expanded model in Figure 2. It is essential to state that this study utilised the construct of computer self-efficacy and of pedagogical beliefs to denote the self-efficacy and learning approach factor. It also assimilated attitude towards e-Learning with the factor on the perceptions on the suitability of e-Learning. In addition, it simply used the construct of use of LMSs in place of the factor on the intensity of use of e-Learning.

Even though the findings of the current study as shown in Table 15, by the correlation of research variables and those in existing literature and reviewed research studies are both in agreement that the use of LMSs affects academic performance, the findings from the current study (Pearson correlation of .581) are not as overwhelming as the ones from the existing reviewed studies. The results obtained from the current study revealed that computing academics' attitude towards e-Learning, their pedagogical beliefs, their computer self-efficacy and their use of LMSs are the factors that directly affect their perceptions on the impact of LMSs on academic performance (see Figure 2).

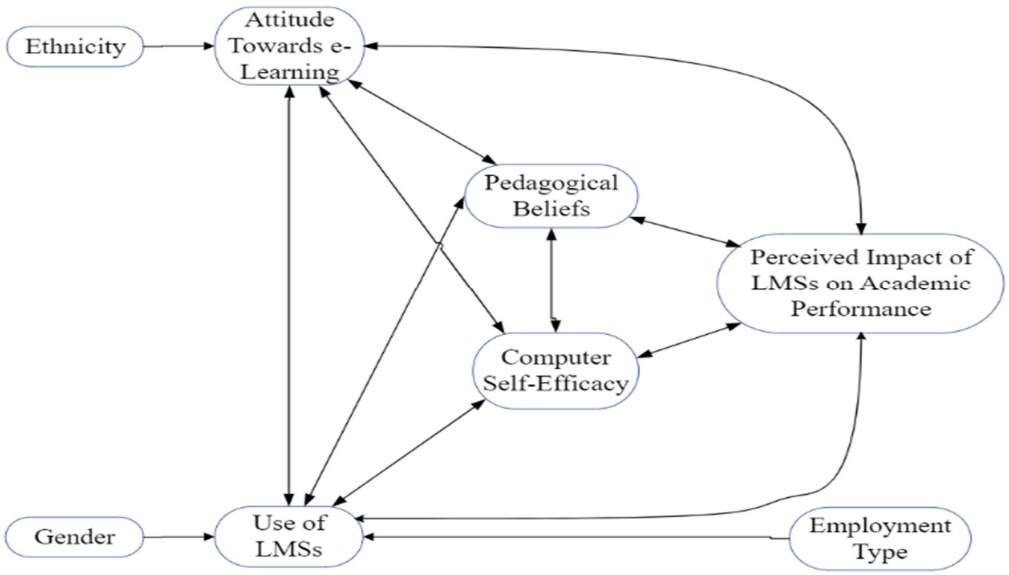

Figure 2: Expanded empirical tested model of factors that are affecting the perceived impact of LMSs on academic performance

Nevertheless, this research study discovered that the employment type of academics either permanent or contract; and their gender directly affect their use of LMSs as displayed by mean values in Table 16 and 17 and Figure 2, and their use of LMSs also directly affects their perceptions on the impact of LMSs on academic performance. In the same vein, this current study also discovered that the ethnicity of academics directly affects their attitude towards e-Learning, and such attitudes also directly affects their perceptions as shown in Table 18 by the mean value of 3.5497 and Figure 2, on the impact of LMSs on academic performance. Conclusion can be drawn that the type of employment of academics (permanent or contract), their ethnicity, and their gender indirectly affect their perceptions on the impact of LMSs on academic performance.

Table 16: Descriptive of differences between LMSs' use and academics' gender

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Female	32	4.06	.70567	.121	3.8050	4.3138	2.60	5.00
Male	46	3.67	.83975	.124	3.4224	3.9211	1.60	5.00
Total	78	3.83	.80587	.091	3.6491	4.0125	1.60	5.00

Table 17: Descriptive of differences between LMSs' use and academics' employment type

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Permanent	56	3.71	.83870	.112	3.4808	3.9300	1.60	5.00
Contract	22	4.15	.62469	.133	3.8730	4.4270	2.90	5.00
Total	78	3.83	.80587	.091	3.6491	4.0125	1.60	5.00

Table 18: Descriptive of differences between academics' attitude towards e-Learning and academics' ethnicity

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Black	39	3.7853	.59531	.09533	3.5923	3.9782	2.50	4.88
Coloured	3	3.7083	1.0483	.60524	1.1042	6.3125	2.50	4.38
White	11	3.3523	.67735	.20423	2.8972	3.8073	2.13	4.75
Indian	23	3.2663	.82684	.17241	2.9088	3.6239	1.75	4.50
Prefer Not to Say	2	3.0625	.61872	.43750	-2.497	8.6215	2.63	3.50
Total	78	3.5497	.72673	.08229	3.3858	3.7135	1.75	4.88

Part of this study's findings is also that computing academics' computer self-efficacy as well as computing academic's beliefs on the self-ability of their students, each has a positive effect by means of Pearson correlation value of .301 and .560 (Table 15) respectively on their perceptions on the impact of LMSs on students' academic performance, while the reviewed literature of relevant studies did not find such relationships.

Conclusion And Recommendations

Overall, more than 66% of the reviewed existing literature in this study revealed that LMSs usage affects or has an impact on academic performance. In addition, the current study found that computing departments academic staff opined that the use of LMSs only slightly (Pearson correlation value of .581) affects academic performance. The current study therefore recommends more research studies to be conducted on the relationship between academics' computer self-efficacy and their perceptions on the impact of the use of LMSs on academic performance, to clearly confirm whether computer self-efficacy, self-ability of students, academics' attitudes toward e-learning influences perceptions on the impact of LMSs on students' academic performance or otherwise.

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Appendix A:

A. Demographics (Independent Variable)

A.1. Institution	DUT		MUT		UNISA		KZN		UniZulu			
A.2. Department												
A.3. Age	Under 30 years		30-40 years		41-50 years		1-60 years		Above 60 years			
A.4. Gender	Male		Female		Prefer not to say							
A.5. Ethnic group	Black		Coloured		White		Indian		Other (specify)	Prefer not to say		
A.6. Employment	Permanent		Contract									

A.7. Citizenship	South Africa		Expatriate		Prefer not to say						
A.8. Rank	Junior Lecturer		Lecturer		Senior Lecturer	Asso Prof.		Full Prof.		Other (specify)	

B. Lecturers' Attitude towards eLearning I believe that eLearning:	**Strongly Disagree**	**Fairly Disagree**	**Weakly Agree**	**Fairly Agree**	**Strongly Agree**
B.1. Eliminates a lot of tedious work for academics.					
B.2. Makes learning easer for students.					
B.3. Improves students' academic performance.					
B.4. Reduces copying and cheating.					
B.5. Brings fun to teaching and learning.					
B.6. Creates opportunities for quality jobs.					
B.7. Creates many communication channels in academia.					
B.8. Reduces the costs of education.					

C. Lecturers' Computer Self-Efficacy I believe I am able to:	**Strongly Disagree**	**Fairly Disagree**	**Weakly Agree**	**Fairly Agree**	**Strongly Agree**
C.1. Type fast on the computer.					
C.2. Type fast on mobile devices (e.g., cell phones, tablets, laptops, etc.).					
C.3. Use common computer programs on my mobile devices (e.g., cell-phone and tablets).					
C.4. Learn new computer tasks through trial and error.					
C.5. Learn new computer tasks with the help of reference manuals.					
C.6. Troubleshoot common computer programs.					
C.7. Understand computer terminology.					
C.8. Use computer programs to analyse data.					

D. Lecturers' Pedagogical Beliefs I believe that learners have the Self-Ability to:	**Strongly Disagree**	**Fairly Disagree**	**Weakly Agree**	**Fairly Agree**	**Strongly Agree**
D.1. Share knowledge, experience, and ideas with others.					
D.2. Adapt acquired knowledge to different contexts.					
D.3. Self-improve their thinking skills.					
D.4. Take responsibility for their learning.					
D.5. Self-improve their academic performance.					
D.6. Relate educational knowledge to their daily life.					
D.7. Analyse situations from different perspectives.					
D.8. Discover relevant strategies for new problems.					

E. Use of LMSs I usually use LMSs to	**Strongly Disagree**	**Fairly Disagree**	**Weakly Agree**	**Fairly Agree**	**Strongly Agree**
E.1. Upload text-based teaching resources.					
E.2. Upload video and audio-based teaching resources.					
E.3. Conduct live interactive teaching.					
E.4. Download students' submissions.					
E.5. Broadcast messages to students.					
E.6. Exchange individual messages with students.					

E.7. Discuss teaching and learning issues with students.					
E.8. Conduct assessments such as quizzes, tests, and exams.					
E.9. Participate in academic newsgroups.					
E.10. Setup time management tasks (e.g. diary, calendars etc.).					

F. Perceptions on the impact of LMSs on academic performance (Dependent variable) I believe that the availability of LMSs improves the academic performance of my students in terms of their ability to:	**Strongly Disagree**	**Fairly Disagree**	**Weakly Agree**	**Fairly Agree**	**Strongly Agree**
F.1. Adapt existing solutions to different domains or ranges.					
F.2. Analyse the complexity of existing solutions.					
F.3. Apply existing solutions to different contexts.					
F.4. Debug, detect, and correct flaws in existing solutions.					
F.5. Design and devise solutions to different problems.					
F.6. Implement a given design into a solution.					
F.7. Model, illustrate, or create an abstraction for a solution.					
F.8. Present or explain a solution to others.					
F.9. Recognise the base knowledge and vocabulary of my subject(s).					
F.10. Refactor, redesign, or optimise a solution.					