

User Experience of Academic Staff in the Use of a Learning Management System Tool

Estelle de Kock
School of Computing
University of South Africa,
Pretoria, South Africa
dkocke@unisa.ac.za

Judy van Biljon
School of Computing
University of South Africa,
Pretoria, South Africa
vbiljja@unisa.ac.za

Adèle Botha
CSIR Meraka,
School of Computing
University of South Africa,
Pretoria, South Africa
abotha@csir.co.za

ABSTRACT

In Open Distance Learning (ODL) institutions the teaching model is moving towards fully integrated information and communication technology applications. To successfully teach or facilitate the use of technology, academics need to have a strong comfort level with the use of technology tools. The academic staff are qualified and experienced subject matter experts but this does not translate to having the necessary technical competencies to do online teaching. They consequently could experience feelings of incompetency to facilitate courseware on a technology platform.

The objective of this paper is to identify the factors that influence the user experience when using a Learning management system (LMS) in an academic institution. The research design comprises a convergent, parallel design mixed-method case study. A literature review was conducted to abstract the factors that influence the user experience into a conceptual framework. An expert review was conducted to evaluate the conceptual framework and then a questionnaire-driven survey was performed. The quantitative responses were analysed and the results revealed that eight of the nine factors proposed in the conceptual framework do have an influence on the perceived user experience of the academic when using the LMS. The scope of this paper is the analysis and presentation of the quantitative results of the study.

The contribution of this paper is to present a framework of the factors that influence the user experience of the academic when using a LMS and to improve our understanding of the experience of the academic and the practical challenges involved for academics that have to facilitate learning in an online environment. The findings should be of interest to developers of LMSs and to institutions in support and training of academics that have to use the LMS.

CCS Concepts

• Human-centered computing → Human computer interaction (HCI) → HCI design and evaluation methods → User studies.

Keywords

User experience, Learning management systems, Open distance learning

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1. INTRODUCTION

The emergence of technology and especially information and communication technology has forever changed the distribution of knowledge and the governance of education. Authorities expect to increase the use of information and communication technologies (ICT) to enhance quality and flexibility in education [1,3,4,11]. Technology can support learning effectiveness, more learner-centred approaches, improved interaction and allow students and academics to collaborate online [7,40]. In the case of Open distance learning (ODL) institutions, the academic staff have to adapt to this changing environment as paper based education transformed to digital communication. It includes blended techniques such as integrated and mixed media and courseware with various modalities for learning development and facilitation. Although the academic staff are qualified and experienced subject matter experts, this does not guarantee having the necessary technical competencies to do online teaching. Consequently they could experience feelings of incompetency to facilitate courseware on a technology platform [33,47].

A positive User Experience (UX) with a system could lead to significant efficiency and effectiveness i.e. improved performance when using that system [45]. A usable Learning management system (LMS) could reduce the academic's time invested in developing and managing the online course so that the focus can be on the quality of the content to be delivered [30]. While, several studies have focused on the effectiveness and benefits of eLearning, only a limited number of studies of LMSs have considered parameters for the UX or usability concerns from the academic or lecturer's perspective [16,18,21,58].

1.1 Purpose and Motivation

In Open Distance Learning (ODL) institutions, the provided Virtual learning environments (VLEs) and LMSs have to be utilised for management and course delivery. To successfully teach or facilitate with the use of technology, instructors need to have a strong comfort level with the use of technology tools [33,35]. Therefore academics, knowledgeable in preparing print based study material, may be reluctant to adopt the LMS. Even an experienced academic could fail to deliver good quality study material in an unfamiliar technological environment [54]. The development and facilitation of online courses as well as structuring and monitoring of online interactions imply a significant workload on academic staff [3,22]. Research has shown that the user experience, in this case the academic's experience with the use of technology, could influence and determine the efficiency and effectiveness of the use of technologies [32,35]. Perceived quality of the user experience has a positive correlation with increased usage of the technology [54].

The objective of this paper is to identify and validate *the factors that influence the UX of the academic* when using a LMS in an academic institution as identified through inspection of the current literature. Research on the potential impact of technology application on learning and teaching indicates that more studies are required to establish the underlying factors for underuse of the LMS for instructional and course delivery in universities [41].

The study will examine the use, perceptions and training needs of the academic staff and propose a framework to enhance the academic staff's user experiences with the use of the LMS. This study supports the notion that enhancement of the user experience would allow the academic to focus on and achieve high task performance in the use of technology [63].

The outcome of the study is a conceptual framework of factors that could influence the UX when using a LMS. It offers a theoretical contribution which can inform educational institutions to improve support in order to enhance the user experience of academic staff when using LMSs.

The research aims to answer the question: *What are the factors that will influence the user experience when using a LMS in an ODL institution?*

1.2 Organisation of this Paper

Section 2 expands on the User Experience literature in section 2.1 and the Components of User Experience in section 2.2 to provide the background for user experience. Section 3 describes the research methodology that guided this study, section 4 explains the data collection and section 5 presents the analysis of the data. Section 6 reflects on the contribution of this paper and concludes with suggestions for future work.

2. LITERATURE REVIEW

2.1 User Experience

This research explored the paradigm of user's experience when interacting with an interactive product, in this case a learning management system. The study intended to identify which values are important for the users when they facilitate online or blended learning in an ODeL (Open Distance e-Learning) environment.

User experience considering non-utilitarian aspects of interactions, including user affect, sensation, and the meaning as well as value of such interactions in everyday life [17,28,38]. The key concern is the human needs and emotional experiences as a consequence of the interaction with the product or system. "The true value of a product is related to the outcome of interaction (the end) and not the interaction itself (means to an end)" [53](p. 1).

In general, user experience explains how people feel about a product and their pleasure and satisfaction when using it or interacting with it. Important aspects of the user experience are the usability, functionality, the aesthetics, the content, look and feel, the sensual and emotional appeal [51]. This study supports the viewpoint as specified by Zaharias & Mehlenbacher, [61] that UX is a dynamic process that involves traditional Human Computer Interaction (HCI) usability and accessibility together with the qualities of hedonic and affective design as proposed by Hassenzahl & Tractinsky [24]. In the milieu of HCI the User experience (UX) is every aspect subsequent to the interaction between an object or system and a person within a certain context of use. This implies that contextual factors also have an effect on the experience [46,59].

As reasoned by a group of UX specialists [52] UX can be viewed from different perspectives: UX as a phenomenon, UX as a field of study and UX as a practice. These perspectives are set out in Table 1.

Table 1: Different perspectives of UX [27]

Perspective	Description
UX as a phenomenon	<ul style="list-style-type: none"> Describing what UX is and what it is not Identifying the different types of UX Explaining the circumstances and consequences of UX
UX as a field of study	<ul style="list-style-type: none"> Studying the phenomenon, e.g. how experiences are formed or what a person experiences i.e. present, past or future (expectance) of UX Finding the means to design systems that enable particular UXs Investigating and developing UX design and assessment methods
UX as a practice	<ul style="list-style-type: none"> Envisioning UX, e.g. as part of a design practice Representing UX, e.g. building a prototype to demonstrate the desired UX to others Evaluating UX Delivering designs to enable UX

The current study entails an instance of all three perspectives since it investigates the UX as a phenomenon through the literature, investigates UX as a field of study to find out what factors could influence the UX of the academic when using a learning management system by means of an online questionnaire and investigates UX as a practice that evaluates the UX of the academic when using a learning management system.

2.2 Components of User Experience

Hassenzahl & Tractinsky [24] contend that UX is the consequence of interaction between three components namely the user, the system and the context within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use). The literature review for the current study highlights the elements of the components as the *user* with its predispositions, expectations, needs, motivation, mood, etc.; the *system* with the pragmatic quality, hedonic quality, usability, functionality, etc. and the *context* i.e. the technical, organisational, physical environment. These components of UX form the principal components of the research structure. Corresponding to this viewpoint Roto et al. [52] refers to the concepts as "factors affecting user experience". However in this research it is indicated as the components of user experience. This viewpoint as used in this research is illustrated in Figure 1.

User experience research inspects the total quality of the system or product [16]. This study focuses on the academic staff's interactions when using a goal-oriented teaching and learning tool. The main objective of an academic when interacting with the LMS would be to develop, maintain or facilitate courseware. This implies that the pragmatic goals will be implicit. The hedonic features could also be significant but it will depend on the perceptions and experience of the individual.

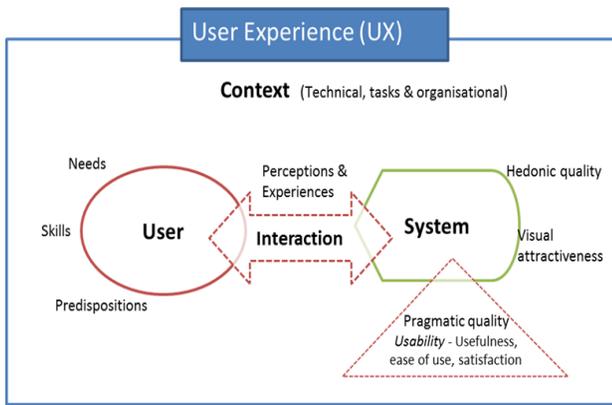


Figure 1: A schematic view of UX (as in this study) with the components Context, User & System

This research examines the user experience of the academics by considering their reflections of the LMS *while* using the system and *after* using the system. It reflects on the user satisfaction component as well as on the experiential and emotional aspects. The study investigates the positive as well as the negative experiences and the consequences on the academic staff's perceived ability to facilitate teaching with the use of the LMS.

The different components and factors that have been discussed in the preceding paragraphs will be categorised in order to construct a preliminary framework. This conceptual framework portrays the factors that may influence the user experience when using the LMS and provides the fundamental information for the compilation of the questions for the questionnaire as well as the foundation for the analysis of the data.

3. RESEARCH METHODOLOGY

This paper presents the quantitative part of a mixed method design study. The Convergent parallel design as presented by Creswell & Clark [14] has been chosen since the quantitative and qualitative data collection were done during the same phase of the research process, the data analysis was done independently and the results only mixed during the concluding interpretation.

The quantitative research component involved the statistical analysis of data collected through the questionnaires.

The research strategy was based on a single case study [60] conducted with the use of a questionnaire to collect the data at one ODL institution. The system applicable in this study is an open source Sakai LMS. The goal is to have a sufficient framework on the theories, propositions and structures that exist in literature.

3.1 Research Design

The research was done through five phases, depicted in Figure 2. The phases are explained as follows:

Phase 1: Literature review - The literature study examined relevant literature in order to identify the components of UX and to identify factors¹ that influence the user experience when using a LMS. The components² were revealed from the literature as: the user, the system and the context of use.

¹ In this research *factors* are considered as influences or reasons that could impact an experience

² In this research *components* are considered as entities that are always present in user experience despite varying circumstances

Phase 2: Conceptual framework -

• **Compile conceptual framework** - A conceptual framework was compiled through scrutiny of the relevant literature concerning user experience, usability, learning management systems and open distance learning to identify the potential factors that could influence the user experience when using a learning management system. The conceptual framework indicates the components of the UX: the *user* with its predispositions, expectations, needs, motivations, moods, etc.; the *system* with the complexity, purpose, usability, functionality, etc. and the *context* as the ODL institution with its requirements and demands. These components of user experience are presented as main categories in the framework. The groupings of the factors that will influence the user experience when using the LMS are according to these categories.

Table 2: Summary of the conceptual framework

UX components	Factors that could influence the UX when using a LMS	Literature
User	The academic has certain <i>needs</i> when facilitating courses in an online environment	[26,27,31]; [22,36,49]
	The <i>skills</i> of the academic	[42,44,50,58]
	The academic's mood, perspective, attitudes, etc.	[39,48,52,56]
System	Pragmatic quality: Perceived usability of the system (LMS)	[23,24,29]
	The pedagogical appropriateness of the system (LMS)	[12,15,19]
	Hedonic quality: Pleasure and attractiveness	[24,25,34]
Context of use	Organisational : The ODL context strategies; Development/training support	[2,13,37]
	Institutional administrative and structural procedures	[8,19,57]
	Technical : Available technologies to be used with the LMS e.g. multimedia and collaborative toolsets in a distributed web-based environment, OER's, MOOCs. Technical support .	[43,55,62]

• **Evaluate with an expert review** - The conceptual framework was reviewed by five experts in the fields of usability, instructional design and pedagogy, online teaching and user experience. These experts come from diverse domains in order to obtain more comprehensive feedback from different viewpoints, to perform a deeper evaluation i.e. different aspects are taking into account [5]. For the purpose of the expert review the conceptual framework was supplemented with 'Evaluators feedback' columns. The evaluators had to rate the stated factors according to their opinion on a four rating scale: Very important; Important; Neutral; Unimportant. There was an open invitation to the experts to give their opinion on the applicability of the factors in the certain context. The experts completed the evaluation and opportunities were created before and during the evaluation to align conceptual understanding of terms used.

The experts' opinions were considered for the following reasons:

- To ensure the comprehensiveness of the statements;
 - To ensure the correct use of language;
 - To ensure the applicability in the ODL environment;
 - To ensure the relevancy from the academic viewpoint; and
 - To ensure content validity.
- The expert feedback was integrated in the conceptual framework.

Phase 3: Data collection -

- **Compile a questionnaire** - The propositions were transformed into questions. The first section's questions were to collect the demographic information and the second section had questions regarding the perceptions of the academics' user experience when they use the LMS. The responses were on a 5 point Likert scale. The last question was an open ended question.
- **Send out the questionnaire to all the academics in the ODL institution** - The questionnaires have been sent out to approximately 1500 academics in the institution. The response rate was approximately 10 % i.e. 158 respondents.

Phase 4: Data analysis – The quantitative data was analysed using SAS, SSPS and Excel. The qualitative data was coded and analysed using Atlas.ti. Please note that only the quantitative data analysis is been reported in this paper.

Phase 5: Revised framework - The original conceptual framework is revised and amended to present a new conceptual framework: *The factors that will influence the user experience when using a LMS in an ODL institution.*

perceptions, questions on usability of the LMS, questions on training and support issues and open ended question regarding user experiences.

The purpose was to find if the participants in the case study perceived the identified factors as having an influence on the user experience when using the LMS. The questionnaire was compiled on Google Drive (<https://www.google.com/forms>). The questionnaire was divided into two sections, A and B. Section A was to obtain contextual information. The first ten questions were to find out regarding the demographics: College, Department, Discipline, Number of courses offered (blended or online), Gender, Job Position, Age, Number of years using the LMS for blended or online courses and Level of computer skills. In the next twenty questions the participants had to indicate which of the LMS tools they were using for online or blended courses, and how often. Section B was to find out how the participants perceived the LMS while using it for facilitation of blended or online courses. This section included 45 questions using a 5 point Likert scale. The System usability scale (SUS®) questionnaire was integrated into the questionnaire in order to do subjective usability measurement [9,10]. These ten questions were modified to fit the applicable system in the case study. The other 35 questions were

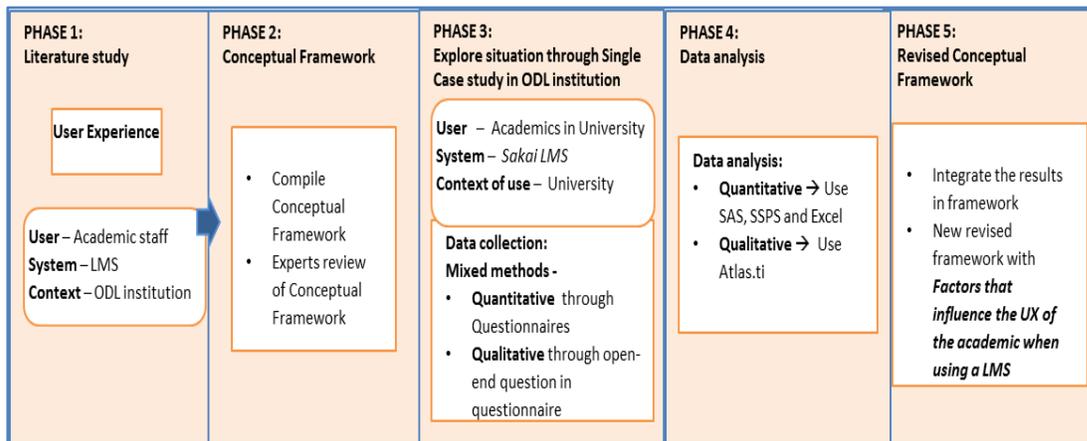


Figure 2: Schematic explanation of the research design of this study

3.2 Ethics and scope

Ethical clearance was obtained from the institution where the study was done and the researchers adhered to the principles of informed consent; voluntary participation and confidentiality.

The scope of the research data is data collection at one ODL institution. The study focused on the user experiences of the academic staff's interactions when using a goal-oriented teaching and learning tool. The expert review of the conceptual framework was done by computer literate academic staff.

Evaluation of the whole user experience could be from the expectation before using the system, interaction while using the system to reflection after using the system. For this study the data collection is mainly a reflection after the system has been used, or of the overall user experience of the system.

4. DATA COLLECTION

The measuring instrument, a questionnaire was generated to acquire the quantitative data (numeric data), which was analysed by using statistical analysis procedures. The questions were obtained by conversion of the propositions of the contextual framework into questions. The questionnaire covered five areas of enquiry: demographic information, questions on respondents'

generated from the propositions in the conceptual framework. The questions were used to collect quantitative data except for the last question in the questionnaire which was an open ended question asking about personal opinions regarding the LMS.

Questions were asked about their interaction, assessment strategies, motivations and concerns regarding quality. Although Vargas-Avila and Hornbæk [6] contend that measurement of behavioural observations of UX will enhance the validity of UX research, these aspects were not examined in this study. The overall perceptions from users, in this case the academics, of the LMS were seen as an appropriate criterion to use in a complex system where the activities with the LMS are chosen by the academics.

The dimensions of UX are the accomplishment of the user (general UX of the system); emotions and affect; enjoyment and aesthetics [6] and not the measurement of the system as with usability studies. The introductory information which accompanied the survey explained the purpose of the research and questionnaire; it provided details about the ethical clearance and permissions that were obtained and the researchers involved. The participants were informed of their right to end the partaking, the confidentiality and anonymity of the data analysis.

The questionnaire was piloted with three academic staff members before it was sent out to the rest of the academic staff. These participants gave comments and advice where the wording and terminology were not clear. The final questionnaire was sent out by email to all (approximately 1500) academic staff in the institution. There were 158 respondents who completed the questionnaire.

5. DATA ANALYSIS

The conceptual framework was summarised into a condensed format which contains the list of proposed factors (related to the components) that were identified in the literature. This served as an analytical framework to analyse the proposed factors [20]. The framework classifies the constructs and aids the systematic evaluation of the data.

Specific factors that affect UX have been identified in the literature and independent researchers have acknowledged these factors. The current research therefore assumes that factors do exist. It is furthermore reasoned that a measuring instrument could be designed to measure academics perception of the effect of these factors on UX. Based on this reasoning and on the data collected from academics via the designed questionnaire the quantitative analysis strategy for this research was therefore designed to do the following:

- Firstly the background of the research was outlined to contextualise the study by describing the biographical properties of the research participants that participated in the research.
- The analysis was taken further to assess the goodness of fit of the different questions associated with the various factors that have been evaluated in the questionnaire by calculating the Chi-square. The two-way Chi-Square technique was used for determining the significance of the difference between the frequencies of occurrence in two or more categories (5 use-levels) with two or more groups (different set of questions per factor).
- A scale reliability test was done on each subset of participant responses to determine the internal consistency reliability of each of the subsets of responses.
- The analysis proceeded with the calculation of perception measurements.
- These scores were then used to evaluate perceptions by calculating *Tables of Means*:
 - Firstly overall means for all participants were calculated for each of the nine factors – this provides a first measure of positive or negative perceptions;
 - Thereafter, this perception means for each of the 9 factors were calculated for various categories of the biographical properties of participants.

5.1 Exploratory analysis

In this section the background of the research to contextualise the study is displayed by describing the biographical properties of the research participants that participated in the research.

The participants were from nine colleges but the majority came from five colleges i.e. the College of Science, Engineering and Technology (38), College of Economic and Management Sciences (33), College of Human Sciences (33), College of Law (21) and College of Agriculture and Environmental Sciences (14). This variation was valuable since it was necessary to obtain input from different discipline pedagogies.

The majority of the participants i.e. 63% are lecturers or Senior lecturers, while 31% were associate professors or professors and

6% junior lecturers. As depicted in Figure 3, the majority of the participants were between the ages of 31 and 60 years (82% collectively).

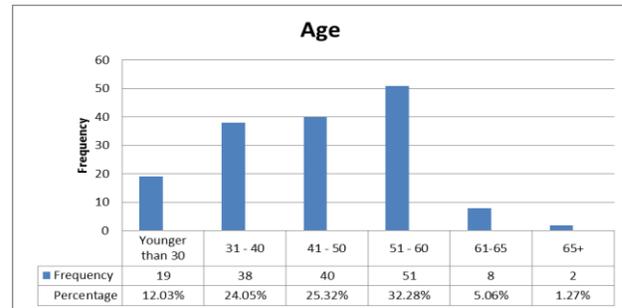


Figure 3: Age of participants

Most of the participating academics (82%) have more than one year experience with the use of the LMS.

As displayed in Table 3, the majority of the participating academics (73%) rated themselves as being highly skilled in the use of computers. Another 26 % rated themselves as average and only one academic rated him/her as a novice user. From this feedback we can thus deduce that most of the participants were comfortable using technology.

Table 3: Distribution of participants' level of computer literacy

Computer Skills	Frequency	%
Novice: I battle to perform electronic tasks expected of me	1	0.63
Average: I cope with general computer tasks	42	26.58
High: I perform specialized tasks and learn new skills by myself	99	62.66
Very high: I do complex computer programming or other specialized tasks and solve my own computer problems	16	10.13

Blended Learning utilisation: In this section a blended learning indicator for participants is calculated. The two-way Chi Square is a convenient technique for determining the significance of the difference between the frequencies of occurrence in two or more categories (5 use-levels) with two or more groups (in this instance 20 tool types). As evident from Table 4 the probability of a Chi-square statistic assuming the value of 1109.39 under the null hypothesis that the frequency-of-use pattern for all blended learning tools are the same is <0.0001***. This is statistically significant on the 0.1% level of significance (with 76 df). Therefore the alternative hypothesis can be accepted that some frequency-of-use response patterns of blended learning tools differ statistically significantly from others.

Table 4: Participants' Utilisation of the LMS tools

Blended tools	Frequency of use of tools					
	Not at all	Rarely	Sometimes	Often	Always	Total
Additional resources	4	12	34	38	70	158
Announcements	1	0	16	47	94	158
Blogs	91	34	20	5	8	158
Discussion forums	9	8	23	35	83	158
Discussions	29	16	26	29	58	158
FAQs	46	30	31	21	30	158
Glossary	80	36	25	6	11	158
Gradebook	103	25	13	7	10	158
Learning units	32	13	20	37	56	158
Meetings	100	32	14	8	4	158
News	105	22	14	11	6	158
Podcasts	101	22	16	13	6	158
Q & A	67	33	28	15	15	158
Schedule	53	25	23	22	35	158
Self-assessment	50	25	31	22	30	158
Statistics	48	18	35	29	28	158
Syllabus	72	29	23	18	16	158
Web content	69	25	25	19	20	158
Wiki	108	18	22	6	4	158
Course contact	31	21	26	41	39	158
Total	1199 37.94%	429 13.58%	465 14.72%	623 19.72%	444 14.05%	3160 100.00%

Chi-square statistic = 1109.39***

5.2 Perceptions of the academics regarding the use of the LMS

The nine factors, as it have been identified in the literature are measured for how participants perceive the interaction with the LMS i.e. the user experience of using the LMS system.

Scale reliability tests were performed to verify the internal consistency reliability of the nine subsets of responses that probed perceptions of the impact of these factors on UX. It informs that the Cronbach alpha coefficients all exceed the value of 0.7. In other words, the responses to these subsets of questions can be used to calculate nine perception measures that indicate how participants perceive the factors to impact user experience.

A composite table is provided with the nine frequency totals of the response patterns of participants to nine sets of questionnaire questions that evaluate how respondents perceive each of the nine factors. This table includes the Chi-squares (the two-way classification test) which was done for each of the nine factors e.g. the academic's needs (11 questions) and participant's frequency-preference of use (5 use-levels).

The response patterns of the nine tables will each be discussed briefly. The purpose of the discussion is to indicate whether participants generally perceive the factors as having an influence (positive or negative) effect on user experience.

Table 5: Summary of perceptions of participants on how the factors could influence their experience with the use of the LMS.

Row	Factors that could influence the UX when using a LMS	Number of questions	Not at all	Rarely	Some-times	Often	Always	Total	Chi-square
1	The academic has certain <i>needs</i> when facilitating courses in an online environment	11	117	222	456	563	364	1722	395.70***
2	The <i>skills</i> of the academic could influence the UX when using the LMS	9	36	141	384	546	308	1415	220.41***
3	The academic's mood, perspective, attitudes, etc. could influence the UX	8	64	187	427	401	185	1264	288.95***
4	<i>Pragmatic</i> quality: The (technical) usability of the system (LMS)	24	332	604	1099	1211	497	3743	871.28 ***
5	The pedagogical <i>appropriateness</i> of the system (LMS)	6	55	123	321	339	110	948	32.66*
6	<i>Hedonic</i> quality: Pleasure and attractiveness	10	179	279	544	421	152	1575	228.88***
7	Organisational: The ODL context strategies; Development/training support	16	213	445	800	762	304	2524	538.75***
8	Institutional administrative and structural procedures	5	110	174	257	160	89	790	82.56***
9	<i>Technical: Available technologies</i> to be used with the LMS e.g. multimedia and collaborative toolsets in a distributed web-based environment, OER's, MOOCs. <i>Technical support.</i>	10	143	276	466	525	166	1576	393.88***

Legend for statistical significance:

* : statistically significant on the 5% level of significance (associated F-probability is ≤ 0.05)

** : statistically significant on the 1% level of significance (associated F-probability is ≤ 0.01)

*** : statistically significant on the 0.1% level of significance (associated F-probability is ≤ 0.001)

E.g. The probability that the Chi-square statistic assumes the value of 395.70 under the null hypothesis that frequency response patterns for the different questions do not differ statistically significantly is < 0.001 . Therefore highly significant on the 0.1% level of significance (***)

5.2.1 User - The academic has certain needs

Table 5, row 1 shows that the majority of rating responses to the 11 questions (that probed perceptions of academics needs when

facilitating online learning) fell towards the '4' and '5' rating scores (54%) Since the '4' and '5' rating values indicate 'strongly agree' and 'agree' perceptions, this translates into academics that strongly express that they do have needs when facilitating online

learning – this suggests that *academic needs* affect user experience. The sum of the selected ‘1’ and ‘2’ rating responses recorded in this table is 19.6%. Thus, more participants indicated that they do agree that the academic has needs when facilitating online learning than those who indicated disagreement.

5.2.2 User - The skills of the academic

Table 5, row 2 indicates that the majority of rating responses to the 9 questions that explored if the academics perceive that their skills influence the user experience when facilitating online learning, fell towards the ‘4’ and ‘5’ rating scores (in total 854 of 1415 or 60%) versus 12.5% of the rating scores that were below 3 i.e. ‘1’ and ‘2’. This shows that academics indicated that they do think that their skills influence facilitating online learning – this suggests that academic skills affect user experience.

5.2.3 User - The academic’s mood and attitude

As shown in Table 5, row 3 the majority of rating responses to the 8 questions that explored if the academics’ mood or attitudes influence the user experience when facilitating online learning, fell towards the ‘4’ and ‘5’ rating scores (in total 586 of 1264 or 46%) while only 251 responses in total or 19.8% were below 3. Thus, more participants indicated that they do agree that the academic’s mood or attitudes have an influence when facilitating online learning than those who indicated disagreement.

5.2.4 System - Pragmatic quality: The usability of the system

Table 5, row 4 shows the responses to the 24 questions regarding the pragmatic quality of the system. The rating scores fell 45.6% towards the ‘4’ and ‘5’ (in total 1708 of 3743) in comparison to the 25% below 3 rating responses (936). This shows that academics indicated that the perceived usability of the system influences facilitating online learning and thus suggests that pragmatic quality affect user experience.

5.2.5 System - The pedagogical appropriateness of the system

In Table 5, row 5 it is demonstrated that the majority of rating i.e. 47% responses to the 6 questions that validated if the pedagogical appropriateness of the system influences the user experience when facilitating online learning, fell towards the ‘4’ and ‘5’ rating scores (in total 449 of 948). The rating responses below three were 18.7% (178 responses). Consequently, we can deduce that the pedagogical appropriateness of the system have an influence on the user experience when facilitating online learning.

5.2.6 System - Hedonic quality: Pleasure and attractiveness

Table 5, row 6 indicates that the majority of rating responses to the 10 questions that verified that the academics perceive the hedonic quality of the system influential to the user experience when facilitating online learning since 36% fell towards the ‘4’ and ‘5’ rating scores (573 of 1575) comparing to 18.9% response ratings (298) which were below ‘3’. Thus, more academics do find that pleasure and attractiveness of the system i.e. hedonic quality do influence the user experience when facilitating online learning.

5.2.7 Context - Organisational: The ODL context

As indicated in Table 5, row 7 the majority of rating responses were above ‘3’ i.e. 42% (1066 of 2524) in comparison with the 26% below ‘3’ rating responses. Consequently, most participants indicated that they do agree that the ODL institution as the context

has an influence on the user experience when facilitating online learning.

5.2.8 Context - Institutional administrative and structural procedures

Table 5, row 8 displays that 35.9% of the rating responses fell towards the ‘1’ and ‘2’ rating scores (284 of 790) versus 31.5% (249 responses out of 790) which were above ‘3’. Thus, slightly more participants indicated that they don’t agree that the institutional administrative and structural procedures have an influence on the user experience when facilitating online learning than those who indicated that the institutional administrative and structural procedures do have an influence on their experience.

5.2.9 Context - Technical: Available technologies and technical support

Table 5, row 9 shows that 43.8% of the rating responses to the 10 questions that explored if the available technologies and technical support influence the user experience when facilitating online learning, fell towards the ‘4’ and ‘5’ rating scores (691 of 1576). The rating responses recorded below were only 26.5%. Thus, the most participants indicated that they do agree that the available technologies and technical support has an influence on the user experience when facilitating online learning.

5.2.10 Summary

The responses provide evidence that nearly all of these factors do have an influence on user experience when using a LMS to facilitate online learning. However, the responses to the factor ‘Context - Institutional administrative and structural procedures’ shows that slightly more participants (35.9% in contrast to 31.5%) indicated that the institutional administrative and structural procedures do not have an influence on the user experience.

5.3 Calculation of perception measures

The analysis proceeds with the calculation of perception measurements. These measurements are referred to as ‘scores’ and can be calculated as the average rating response to a group of questions that describe the UX factors for each participant.

These scores measure how every participant perceive each factor to affect the user experience of academics i.e. a value close to ‘1’ will indicate disagreement or negative perceptions, and values closer to ‘5’ agreement or positive perceptions.

These scores can now be used to evaluate perceptions by calculation of *Tables of Means* so that overall means (averages) for all participants can be calculated for each of the nine factors – this will provide a first measure of positive or negative perceptions.

Table 6 presents the overall calculation of perception measures for the nine UX factors to enable this research to evaluate how respondents and respondent-groups perceive the nine factors. The table for example indicates that participants in general agree that skills do affect UX. This statement can be made because the mean value for the factor U2, is reported as 3.67. If rounded to the nearest integer, this will be 4. A rating score of ‘4’ indicates agreement. Therefore the mean value indicates that participants in general perceive that skills affect UX.

Table 6: Calculation of perception measures for the nine UX factors

Var	Factor	N	Mean	StdDev	Min	Max
U1	The needs of academics	158	3.48	0.58	2.00	5.00
U2	The skills of the academics	158	3.67	0.67	1.67	5.00
U3	Mood, attitude of the academics	158	3.22	0.73	1.43	5.00
S1	Pragmatic quality: system usability	158	3.38	0.63	1.95	5.00
S2	Pedagogical appropriateness of system	158	3.30	0.86	1.00	5.00
S3	Hedonic quality: Pleasure etc. of system	158	3.15	0.75	1.11	4.89
C1	Organisational - ODL context	158	3.39	0.63	1.83	5.00
C2	Administrative & structural procedures	158	3.03	1.05	1.00	5.00
C3	Available technologies and technical support	158	3.19	0.59	1.89	4.89

The other means of this table are interpreted likewise and the revised conceptual framework is presented in Table 7.

Table 7: Revised conceptual framework (condensed)

Factors that could influence the UX when using a LMS
The academic has certain <i>needs</i> when facilitating courses in an online environment
The <i>skills</i> of the academic
The academic's mood, perspective, attitudes, etc.
<i>Pragmatic</i> quality: The (technical) usability of the system (LMS)
The pedagogical <i>appropriateness</i> of the system (LMS)
<i>Hedonic</i> quality: Pleasure and attractiveness of the system
<i>Organisational</i> : The ODL context strategies; Development/training support provided in the institution
<i>Technical</i> : Available technologies to be used with the LMS e.g. multimedia and collaborative toolsets in a distributed web-based environment, OER's, MOOCs. Technical support in the institution.

6. CONCLUSION

The aim of the research was to answer the question: *What are the factors that will influence the user experience when using a LMS in an ODL institution?* The quantitative analysis demonstrated that eight of the nine factors portrayed in the conceptual framework do play a role and thus influence the user experience when using a LMS in an ODL institution. The only factor that participants do not perceive as having an influence on the user experience is the factor: The *Institutional administrative and structural procedures* in the Context (cf. 5.2.8).

The practical contribution of this study is that our understanding of the user experience and the practical challenges involved for academics that have to facilitate learning in an online environment has broadened. The theoretical contribution is a conceptual framework which was twice validated. Firstly by the expert review and secondly by the analysis of data collected through a questionnaire. According to this evidence we can deduce that eight of the proposed factors do indeed have an influence on the user experience of academics when using a LMS in an ODL institution. This conceptual framework can inform educational institutions on improving support in order to enhance the user experience of academic staff when using LMSs.

Quantitatively there will be further explorations of relationships between user experience and the demographic context of the academic. The qualitative analysis lies outside the scope of this paper but it is planned as future research towards providing insight and explanations for some of the quantitative findings.

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