

FACTORS AFFECTING THE POST-IMPLEMENTATION ADOPTION AND USAGE OF BLACKBOARD AMONGST ACADEMICS AT DUT

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Abstract

Universities around the world have invested heavily in technology which accommodates the digital-age students, and supports their learning experience. Durban University of Technology (DUT) followed the same trend, aligning their strategic planning to revive e-learning by improving pedagogical plans. This exploratory study examined the extent to which various factors influence academics' acceptance and use of the Blackboard system. The system has been deployed but there appears to be resistance on the part of the stakeholder (student or staff members) may result in underutilization. The institution adopted the system in the hope of reaping the rewards such as accessibility, flexibility and self-paced activity. However, such rewards are not always a fait accompli, technology not always being used as expected. Technology Acceptance Model (TAM) was used as a baseline to assess to what extent various factors influence adoption and usage on the proposed model and the model comprises three major factors (i.e., personal, technological, and organizational). A mixed-methods approach using a survey and interviews was employed and extended to all academics at DUT with a teaching responsibility. The results from both electronic survey (e-survey) and interviews revealed factors that seems to be affecting the adoption of the Blackboard system and these factors includes LMS experience, computer skills, and age, particularly in the 41-50 year age group, which indicated a significantly low usage of the system. Upgrading of the system to a more advanced version comprising more features; and increasing the response rate of the technical support staff were revealed by the results.

Keywords: Academic acceptance, adoption factors, higher education, learning management system, technology acceptance model

1. Introduction

The positive impact of Information and Communication Technology (ICT) on all spheres of society is well known, the field of education being no exception; ICT is an integral part of education nowadays. Higher-education institutions are faced with a number of challenges, including:

- Increased student access to higher-education institutions (Akoojee & Nkomo, 2007; Teichler, 2013);
- Poor success rate of students; and staffing resources in terms of student-lecturer ratio (Waghid, 2002); and
- Strained physical resources to accommodate ever-increasing class sizes of recent years (Jaffer, Ng'ambi, & Czerniewicz, 2007).

One way of addressing these challenges is to integrate ICT teaching with relevant learning tools. The rapid emergence of ICT or e-learning tools in the educational sector is a clear indication that e-learning is solving, to a certain extent, some challenges faced by higher education, or that these tools make a difference to e-learning.

The significant benefits of LMS in higher education have been widely studied in the field of education. According to Mahdizadeh, Biemans, and Mulder (2008), LMS is capable of motivating users (students and academics), increasing participation amongst the students in class. Furthermore, LMS offers what traditional learning does not, that is, accessibility, flexibility, self-paced learning, and interactivity. Baker, Bujak, and DeMillo (2012) suggested that the effectiveness of institutions rests on proactively exploring innovative technology, before embracing it. Even though it may seem that investing in LMS is a sure-fire way of moving ahead for universities, the use of this technology faces adoption resistance from both staff members and students.

2. Problem statement

According to Alharbi and Drew (2014), the successful implementation of LMS depends heavily on the academic staff buying-in. Minimizing the significant role played by the academic staff in the implementation of LMS may be seen as a major post-implementation factor in hindering the acceptance of LMS. Therefore the purpose of this study is to answer the following research question: What are the factors affecting adoption and usage of Blackboard at DUT?

The result of this study will shed more light on factors affecting academic staff in higher education in general, and DUT in particular. Apart from the investment (financial and time), it is equally important to invest in academics' training, to ensure that LMS may be utilized to full capacity, being integrated into the teaching and learning culture.

3. Literature review

Higher education institutions are now compelled to adopt relevant technological tools. In a study conducted by Blewett (2012), the result supported the need for a transferral from outdated 'industrial age' models to 'information age' models because outdated models can no longer support modern students' learning and communication experience. Watson and Watson (2007) are of the view that e-learning will play a critical role in meeting contemporary students' needs not met by current approaches to instruction.

The role of LMS in high education is important to support the shift from industrial-age pedagogy to information-age pedagogy that requires support from technology to satisfy modern students. For this reason, LMS plays a critical role to facilitates anytime and anywhere availability of the learning material process (Sejzi & Arisa, 2013). Furthermore, LMS can assist in offering learning resources and instructional activities to students (Yidana, Sarfo, Edwards, Boison, & Wilson, 2013). Findings of the study by Steiner, Götz, and Stieglitz (2013) have suggested that LMS communications' components positively influence students' attention and confidence. Furthermore, LMS has the capability of acting as a repository, tracking students' performance, and delivering learning materials.

Lately, LMS has been widely adopted by higher institutions, however, some institutions are still failing to identify factors impeding the adoption of such systems. TAM has been widely adopted to predict the acceptance and usage of Information System (IS). TAM suggests that the external factors of the system influence perceived usefulness (PU) and perceived ease of use (PEOU), and subsequently, this leads to the actual use of the system.

Despite external factors being attributed to a certain extent as influencing the acceptance and usage of IS, these factors are not applicable to all IS systems,

including LMS. Few researchers have modified TAM to investigate external factors influencing academics' acceptance and usage of the system in general, nor LMS in particular. These authors modified TAM, and proposed a revised TAM in order to understand this phenomenon. Alharbi and Drew (2014) suggested new external variables which included the lack of LMS availability, prior experience, and job relevance. Asiri, Mahmud, Bakar, and Ayub (2012) proposed internal variables (namely, attitude towards using LMS, beliefs towards e-learning, and competence in using LMS) and external variables (namely barriers faced by the faculty members and demographic factors) by adopting Theory of Reasoned Action (TRA) and TAM. Furthermore, Al-alak and Alnawas (2011) adopted TRA and TAM and the results of the study show that there is a correlation between intention to adopt the system and PU, PEOU, computer knowledge, and management support.

The broad engagement with contemporary literature review informed the author's choice of external factors perceived to be affecting the post-implementation adoption and usage of Blackboard amongst academics in higher education institutions. These factors comprises three major factors (i.e., personal factors, technological factors, and organizational factors) as seen in Figure 1. Personal factors include computer experience, LMS experience, and job relevance. Technological factors include system quality, service quality, and technology complexity. Support incorporates factors such as organizational factors, technical factors and training. This study has adopted and modified TAM as a baseline, proposing various suitable external variables (as shown in Figure 1) which predict LMS adoption and usage by academics in higher educational institutions.

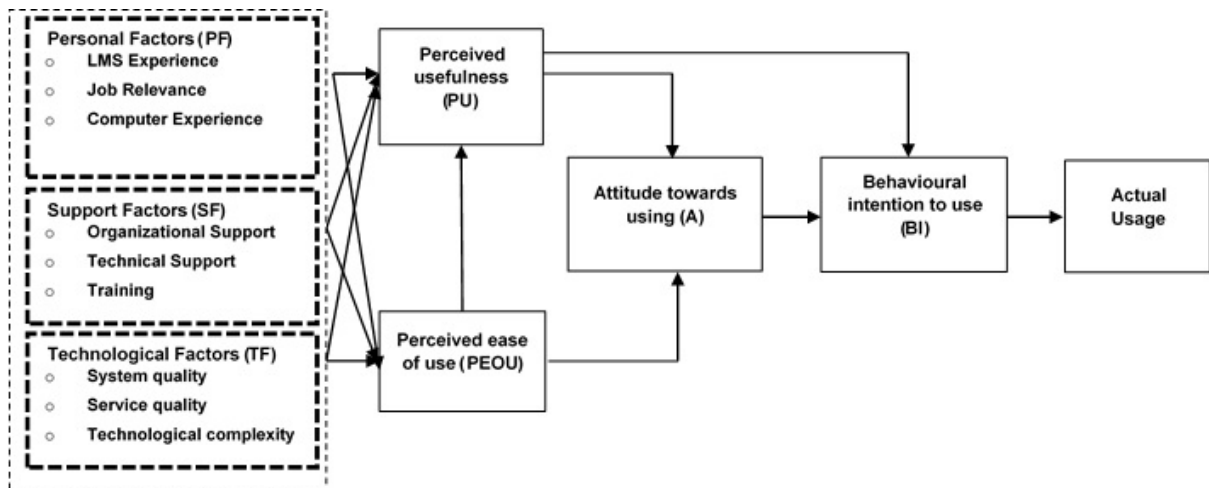


Figure 1: Proposed Academics' LMS Adoption Model

4. Methodology

This study reports on the mixed-methods approach (quantitative and qualitative) consisting of electronic survey (e-survey) and interviews. Convenience sampling was used for the quantitative approach (e-survey) and purposive sampling was used for the qualitative approach (interviews) because DUT staff are the targeted group and the only group that can provide the necessary information required in this study.

A pilot study was conducted to achieve an advance warning about any possible risks that could threaten or jeopardize the study; or to ensure that the proposed questionnaires or language or methods used were appropriate and not complicated. The pilot testing or preliminary survey was carried out on five academics in the faculty of Accounting and Informatics, prior to the actual survey. After the pilot study, the questionnaire went through changes to improve its quality and presentation.

4.1. Data collection methods

4.1.1. Questionnaire

During the first week of August 2014, electronic survey (e-survey) driven by a Google Forms was administered to all permanent academics of DUT with teaching responsibility. All the prospective subjects were invited per the email account of the institution. This was to allow the researcher to benefit from the following: reaching a substantial number of subjects, having a survey cheap and easy to administer, obtaining a speedy response, with subjects answering at their own convenience.

However, the challenges normally faced by this data collection method include access to a computer, and unwillingness or lack of time to participate. Fortunately, all the subjects had access to a computer. The subjects were sent two reminders after intervals of two weeks, however, despite the reminder, unwillingness or lack of time to participate were amongst the major inhibitory factors, as had been anticipated. A month after the questionnaire was administered, the daily response rate reached zero, prompting the researcher to change to a manual questionnaire. As a result, the response rate increased slightly, to above 50% (111 academics of DUT having a teaching responsibility) of the required sample. The researcher was hoping to achieve a response rate of over 90%. However, the issue of adequate response rate has created mixed reactions amongst researchers. According to these authors the acceptable rate is as follows: 50% (Babbie, 1990; Babbie & Mouton, 1998), 70% (Dillman, Christenson, Carpenter, & Brooks, 1974) and 60% (Kiess & Bloomquist, 1985). Therefore, the response rate was sufficient for this study.

4.1.2. Interviews

Interviews were conducted to gain sufficient depth, and provide new insight into the phenomenon being investigated. To participate in an interview, the subjects were asked to voluntarily fill in their details on the questionnaire. Only ten subjects showed an interest in participating in the follow-up interview. The other subjects opted not to participate owing to numerous reasons, ranging from time constraints to a lack of interest. Appointments were made and face-to face interviews of 20 minutes were conducted. A sufficient number of interviews is often an ambiguous question. Guest, Bunce, and Johnson (2006), attempted to answer this question. The finding revealed that data saturation arose on the first twelve interviews, while themes emerged within six interviews. Findik Coskuncay and Ozkan (2013) investigated the factors affecting academics' behavioral intention to use LMS (similar to the current study), they surveyed 224 academics; only 10 of them were interviewed.

4.2. Ethical issues

The ethical clearance was received from the University of KwaZulu-Natal (UKZN) Ethics Committee; and a gate-keeper's letter was obtained from the Office of the Registrar at DUT. Subjects were asked to fill in the informed consent and were also

informed of the study's objectives, and information expected of them prior to participating. Information collected from subjects will remain strictly confidential between the researcher and the subjects.

4.3. Data analysis

The data collected through questionnaire was analysed using the 22nd version of the statistical software called SPSS and the following data-analysis tests were performed: Chi-Square Goodness-Of-Fit test, Wilcoxon Signed Ranks test, Regression analysis, Kruskal Walls test, and Mann Whitney U Test.

Moreover, data collected through the interviews was analysed by using narrative analysis and the interview questions were informed by the results of the questionnaire to gather quantitatively in-depth reasons for the responses. The interview questions were categorized into two sections:

- Group A (for those who do use Blackboard system, even to only a small extent). The aim was to ascertain the motivating factors for using the Blackboard.
- Group B (for those who do not use the Blackboard system at all). The aim was to ascertain the negative factors accounting for their not using the Blackboard.

5. Data presentation and discussion

Table 1 that follows depicts the demographic information of participants involve in the study that was collected through e-survey.

Table 1 : Demographic summary

Demographics		Frequency	Percentage
Gender	Female	64	57.7
	Male	47	42.3
	Total	111	100.0
Age	>50 years old	33	29.7
	25-30 years old	13	11.7
	31-40 years old	36	32.4
	41-50 years old	29	26.1
	Total	111	100.0
Academic Rank	Associate Professor	3	2.7
	Lecturer	73	65.8
	Professor	2	1.8
	Senior Lecturer	24	21.6
	Specialist Instructor	9	8.1
	Total	111	100.0
Teaching Experience	<1 year	1	.9
	>20 years	35	31.5
	1-5 years	18	16.2
	11-15 years	23	20.7
	16-20 years	15	13.5
	6-10 years	19	17.1
	Total	111	100.0

The consolidated results from the questionnaire and interview will be used to answer the research question. This question was measured by Support Factors (SF) and Technological Factors (TF).

The results of Wilcoxon Signed Ranks test shows that academics were significantly in agreement with the majority of statements pertaining to the SF and TF constructs. These results suggest that support factors and technological factors play a critical role in adoption and usage of the system. The Technological Factors dimension included system quality, service quality, and technology complexity. The correlation between Technological Factors (system quality, service quality, and technology complexity), and dependent variables (PEOU and PU) showed significantly positive; however, PEOU showed a high strength of $r = .667$, while PU showed a low strength of $r = .270$. These results were similar to the findings of the study by Almarashdeh, Sahari, Zin,

and Alsmadi (2010) which revealed that system quality, service quality, information quality, usefulness, and ease of use, influenced the user's satisfaction and intention to use LMS. Findik Coskuncay and Ozkan (2013) also found that technical complexity significantly affects PEOU.

The Support Factors' dimension included the Organizational Factor, Technical Factor, and Training. Findings revealed that on the organizational construct, participants were in agreement that management was supportive. On the training construct, participants also agreed that training provided by Centre for Excellence in Learning and Teaching (CELT) staff improved their ability to use the system, and that it was sufficient. Centre for Excellence in Learning and Teaching (CELT) is a service-provider department of the Blackboard system in DUT. However, when asked whether the technical staff provided prompt support should the Internet be down, using as alternatives various communication means such as email, telephone, chat, etc., participants were in disagreement. This has had a negative effect on the system's adoption. Abbad (2011) concluded that technical support affects the LMS adoption. The researcher also found that technical support directly influenced PEOU and PU. Amongst other factors, a poor response rate from technical support might possibly explain the disconnection between Actual Use and Intention to Use ($r = .149$, $p = .118$) with a low strength. The correlation between Support Factors and dependent variables (PU and PEOU both with a medium strength) also showed significantly positive.

To test whether any of the response options had been significantly selected, the Chi-Square Goodness-Of-Fit test was performed. Results showed that 31% of the academics have used LMS for 1 – 2 years, while only 3% have indicated that they have not used it, nor do they intend using it in the future. This is positive, seeing that the Blackboard system is still in its initial stages. Furthermore, results are compatible with the findings of Alharbi and Drew (2014) that 28.1% have used LMS for 1-3 years; almost half this number (16.95%) have used it for under a year; those with up to 5 years' LMS usage contributed 3.39%; and very few had used LMS for more than 5 years (1.69%). Technology experience is a critical element in positively increasing teachers' confidence in adopting and using LMS (Bandura, 1994). The result of the studies determining influential factors in the use of e-learning by university academics showed that e-learning experience has a significant correlation with actual use

(Mahdizadeh et al., 2008); and user experience is influential in the use of technology (Al-Busaidi & Al-Shihi, 2012; Gautreau, 2011; Mahmud & Ismail, 2010; Venkatesh & Davis, 2000). In contrast, Ball and Levy (2008) found that intention to use LMS is not influenced by technological experience. PEOU ($r = .232$, $p = .014$) and PU ($r = .328$, $p < .0005$) are both statistically significant in LMS experience.

However, the usage between 41 – 50 age groups was significantly low. This result implies that this age group is reluctant to use the Blackboard system. Possible reasons for general low usage emerging from the interview includes persistent downtime of the infrastructures, poor response of technical support staff, limited version of the system, lack of incentives for system's users, and minimal academics' involvement in the Blackboard planning, acquiring, and implementation. Furthermore, these factors impeding adoption and usage of the system might be strategically used to promote usage and adoption. The results of the interview indicated that incentivizing the user of the system, improving response rate of technical support, and upgrading the system, might assist in closing the gap between intention to use and actual usage. The technical support was the only common item measured by both interview and questionnaire, offering conflicting results. The interview result indicated that one of the participants was satisfied with the technical support staff while the questionnaire result indicated that the participants were significantly in disagreement with the statement that technical support staff provides prompt support if the Internet is down. Nevertheless, based on the fact that only one interview participant was satisfied with the technical support compared with the quantitative results, it may be concluded that technical support could be a contributing factor affecting usage and adoption of the system.

The findings of the correlation between a dependent variable (PU) and independent variables (PEOU, LMS Experience, Blackboard Usage, Computer skills, Support Factors, and Technological Factors) showed that Support Factors strongly influence PU; while variables such as PEOU, LMS Experience, Blackboard Usage, Computer skills, and Technological Factors were weak statistically, and may be considered to have no impact whatsoever. At the same time, the results of the correlation between a dependent variable (PEOU) and independent variables (LMS Experience, Blackboard Usage, Computer skills, Support Factors and Technological Factors)

indicate that PEOU is strongly influenced by LMS Experience, Blackboard Usage, Computer skills and Technological Factors; while only Support Factors was statistically weak and may be considered to have no impact.

Figure 2 depicts the summary of results of the correlation coefficients of the research model. The result shows that all constructs of the model are significantly correlated, with the exception of Actual Use and Intention To Use. A single asterisk (*) in the research model's correlation coefficients' path (below) indicates a 0.05 significance level, while a double asterisk (**) indicates 0.01 significance level.

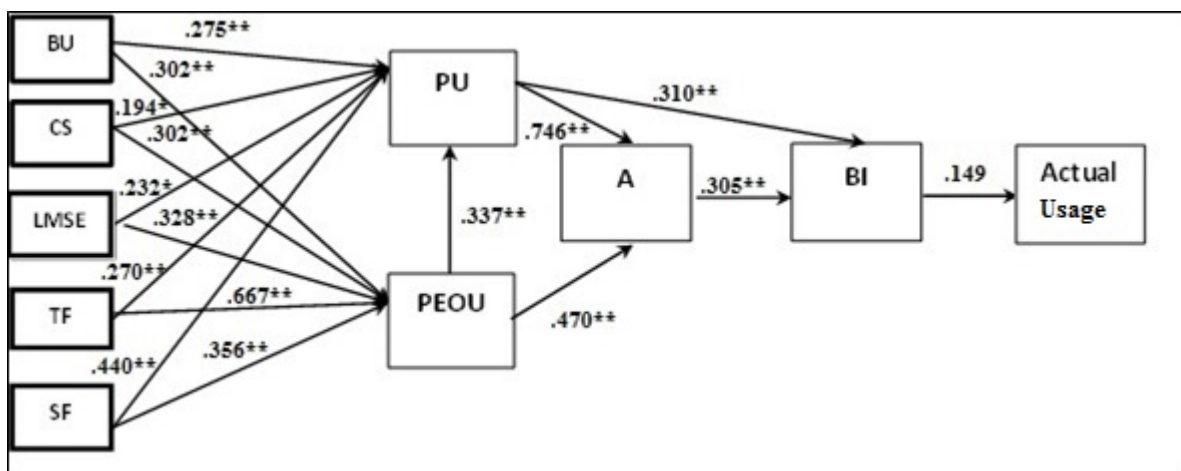


Figure 2: Path of research model coefficients

This section only highlight the important path on the model, based on the higher coefficients' values. The result shows that there was a fair, positive correlation between SF => PU ($r=.440$, $p<.0005$), indicating that the more support provided to academics by the management, technical support staff, and training, the more academics perceive the system to be useful. The results also indicate a strong, positive correlation between TF => PEOU ($r=.667$, $p<.0005$), indicating that the more support is provided to academics to ensure reliability, or availability, and an error-free system, the more academics perceive the system to be easy to use. Furthermore, PEOU ($r=.470$, $p<.0005$) and PU ($r=.746$, $p<.0005$) are both predictors of A, showing strong and medium strength, respectively, and correlating positively with A. Meanwhile, the Actual Use is not significantly correlated with Intention to Use ($r=.149$, $p=.118$), the strength being low. This result indicates a gap between Actual Use and

Intention to Use. This may be because of a lack of incentive or persistent downtime of the infrastructures, and poor response of technical support staff.

6. Conclusion and recommendation

Underutilization of LMS at DUT could lead to undesirable consequences considering the money and time invested by the management of this institution. Even though the system has already been deployed but it appears that there are academics who have resisted adopting and using the system. The factors that seem to be affecting the adoption of the Blackboard system includes LMS experience, computer skills, and age, therefore a more robust training to up skill academics on adequate use of the system is imperative, particularly in the 41-50 year age group, which indicated a significantly low usage of the system. An increase in adoption and usage of the system rests heavily on the upgrading of the system to a more advanced version comprising more features; also providing incentives of using the system, and increasing the response rate of the technical support staff.

Limitations of this study have afforded some valuable future research for scholars to consider. The first future research would be a study to further test the proposed model for similar results in a different context (country or institution or population). Secondly, other factors which could affect the adoption and usage of Blackboard could be explored, not limited to the proposed model.

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