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## Blended learning or face-to-face? Does Tutor anxiety prevent the adoption of Learning Management Systems for distance education in Ghana?

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### ABSTRACT

Learning Management System (LMS)-enabled blended learning has been adopted by higher educational institutions for promoting accessible and effective pedagogy and andragogical practices. The introduction of this mode of learning has altered the traditional face-to-face interaction. However, the lack of actual usage and online presence by instructors in an LMS-enabled blended learning environment seems to be a major setback for its success. Consequently, LMS-related anxiety has been cited as one of the behavioural challenges hindering its usage in Africa. Hence, this paper is focused on unravelling the antecedents of tutors' anxiety towards actual LMS usage based on a Technology Related Stimulus-Response Theoretical Framework (TR-SR-TF). In view of this, the study employed a survey design, adopting a questionnaire as data collection instrument from 267 distance education tutors across study centres within Ghana. The results from Partial Least Squares Structural Equation Modelling (PLS-SEM) technique revealed three underlying factors determining LMS anxiety, namely; colleague influence, outcome expectation and use support. However, the result of the Importance Performance Map Analysis (IPMA) showed that colleague influence was the most important indicator while outcome expectation was the highest performance indicator of tutors' LMS related anxiety. The study recommended that such factors like colleague influence, outcome expectation and use support should be consciously addressed in order to reduce (if not totally eliminate) anxiety towards LMS use for blended learning.

### KEYWORDS

Blended learning; LMS; usage; anxiety; tutors; distance education

## Introduction

The traditional face-to-face class session is inherent with certain limitations that impede the effectiveness of the teaching and learning process in distance education. This is particularly evident, where face-to-face occurs once within a fortnight or in certain specified periods within the semester of a programme. The setback of information sharing, collaboration and continuous interaction among peers, as well as students and instructors (which is characteristic of the constructivist perspective) represent one of the shortfalls in early distance

education (Anderson & Dron, 2011; Aoki, 2012). For distance education practice, the theory of constructivism is at its core, in which the incident of learning responsibility greatly relies on the learner (Duc, 2012; Garrison, 1993; Valasidou, Sidiropoulos, & Makridou-Bousiou, 2005). Sze-Yeng and Hussain (2010) suggest that technology platforms such as Moodle online discussion forums, Google Docs and Wiki Spaces promote self-directed learning among distance learners. However, Biggs (2003) suggests that it is the instructors' responsibility to create learning activities that align with the constructive paradigm. The design of these constructive pedagogies by instructors leads to the creation of new knowledge and understanding by the learner. This is made possible through instructor guidance or collaboration with more knowledgeable peers, as well as interaction with online materials. These constructive activities are shown to promote self-directed learning (Sze-Yeng & Hussain, 2010) which is crucial in distance education, because it creates an intrinsic motivation towards personal pedagogical achievements.

The emergence of e-learning solutions has brought in its wake the possibility of technology in bridging the gap between students and students; students and instructors via virtual communication and resource sharing. However, the benefit of physical presence provided by face-to-face is still a preferred medium, hence the need to augment with an online component. This has brought to the fore the blended mode of learning (which is the mixture of the traditional face-to-face interaction and online components) complementing the strengths of both the pure online and pure face-to-face modes (Siemens, Gašević, & Dawson, 2015). For instance, within this study, the main form of teaching is the use of print-based modules to conduct face-to-face sessions. Students are required to read the modules and meet their tutors fortnightly for face-to-face discussions without any technological mediation. LMS is supposed to bridge this gap in order to foster ongoing collaboration and interaction outside the face-to-face mode.

Though the percentage of what constitutes blended learning is still debatable (Siemens et al., 2015), the simple idea behind blended learning is that, it fosters the combination of both physical presence and online aspects of the teaching and learning process (Garrison & Kanuka, 2004). In view of this advantage, most institutions have implemented this mode, especially in higher education delivery (Naveh, Tubin, & Pliskin, 2012). However, underlying the use of blended learning is the Learning Management System (LMS), a technology that makes it possible for online interaction and sharing of online resources (Siemens et al., 2015; Yueh & Hsu, 2008), which is the core of the blended mode. This technology has been widespread in adoption in the higher educational system over the past decade. Within the African terrain, most institutions have implemented LMS of various kinds and are using it to support traditional face-to-face. The trend caused some predictions of about 15% LMS adoption growth rate per annum in Africa between 2011 and 2016 (Adkins, 2013).

However, despite the high implementation levels, there is the lack of usage on the part of instructors (Park, 2009) which raises a concern about LMS success. This is due to the fact that, optimum benefit of LMS implementation is derived when usage levels are high to meet implementation goals. Martin (2009) indicated that LMS acquisition has been on the rise and yet online presence and usage are low. In view of this, various reasons have been attributed to the lack of usage of LMS, but one important indicator is the LMS anxiety factor (Sun, Tsai, Finger, Chen, & Yeh, 2008). Anxiety towards technology has been in the literature as a possible reason for lack of acceptance and usage (Sun et al., 2008; Yueh & Hsu, 2008).

Within this study, LMS anxiety means the fear or discomfort that tutors exhibit in the event of using LMS technology for blended learning practices in distance education.

According to Hasan and Ahmed (2012), technology anxiety is a negative emotional response, such as fear or discomfort that people experience when they think about using or actually using technology (Jon-Chao et al., 2012). Anxiety as both a personality and behavioural factor operates as a stimulus-response (SR) phenomenon. The fear towards a particular object or situation is a direct outcome of a certain influencing element or stimulus. Stimulus Response Theory is a concept in psychology that refers to the belief that behaviour manifests as a result of the interplay between stimulus and response (Argyle, 1994; Smith & Graybiel, 2014). The Mehrabian–Russell Stimulus-Response Model explains that, environmental stimuli (S) induce emotional reaction (O) which consequently influences individual behavioural response (R) (Mehrabian & Russell, 1974). [Figure A1](#) illustrates the model.

The principle behind this theory is that, in practice, behaviour cannot be elicited without a stimulus of some sort. According to Smith and Graybiel (2014), 'Affective and incentive motivational processes have been seen as guiding forces for behavior as potent as stimulus-response (S-R) associations' (p.1). Based on this premise, the researchers formulated a framework they termed Technology Related Stimulus-Response Theoretical Framework (TR-SR-TF) adapted from The Mehrabian–Russell Stimulus-Response Model. [Figure A2](#) depicts the framework. The implication of this model is that, anxiety does not operate in isolation or in a vacuum but it is triggered or precipitated by certain antecedents. This behavioural outcome could be a product of both technological and social tendencies. To better understand the basis of technological anxiety, there is the need for an initial investigation into the causative variables initiating it. While other studies look at the causes of technology anxiety to be lack of technology experience and low self-efficacy levels, this study views the anxiety factor to be more than just a product of lack of self-belief towards technology and exposure to technology. The occurrence of this emotional response of fear may be a combination of both the factors surrounding the use of the technology itself as well as influence from other referent people who could be colleagues within the same context or environment of use. This paper seeks to find out the determinants of LMS anxiety among distance education tutors as well as the importance and performance levels of these determinants. The rationale is to provide a basis towards implications for policy and practice in distance education. In view of this, the research questions guiding this study include:

- (1) What are the determinants of tutors' anxiety in using LMS in distance education?
- (2) What are the importance and performance levels of these determinants?
- (3) What are the implications of these determinants on policy and practice in distance education?

### **Conceptual model development and hypotheses formulation**

Literature on the relationships between technology-use factors and LMS-related anxiety was reviewed and hypotheses formulated based on the relationships.

### *Relationship between outcome expectation and LMS anxiety*

Outcome expectation defines the extent to which a given technology or system is able to produce the desired results after usage or application. In Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT), the variable is synonymous to perceived usefulness or performance expectancy, respectively. Venkatesh, Morris, Davis, and Davis (2003) and Davis (1989) explain the variable to be the degree to which individuals believe that using a particular technology will enable them to achieve job goals. Individuals often are sceptic about the achievement of intended job outcomes or goals when 'new' technologies are introduced. Familiar to traditional ways of achieving desired job results, new users may entertain some level of anxiety whether the implementation of new systems can get the job done. Within the literature, Jon-Chao et al. (2012) found a relationship between technology-related anxiety and perceived usefulness (which is akin to outcome expectation). Fear of the system failing to achieve intended results may arise if users are not sure of the effectiveness of the new technology. This is likely to produce anxious behavioural tendencies towards the new technology. In this study, tutors' certainty or uncertainty towards LMS usage for blended learning in achieving instructional goals determines, to a larger extent, their anxiety towards LMS. If tutors feel the use of LMS will not produce the desired instructional objectives, they will have a perception of failure of the system and a waste of time and resources in using it. When this happens, their quest to adopt it will be met with anxiety. This is generated by the fear of system failure and waste of time and effort. In view of this, the paper hypothesises that:

H1: Tutors' uncertainty of outcome expectations of LMS has an effect on anxiety towards LMS usage for blended learning.

### *Relationship between flexibility of use and LMS anxiety*

Flexibility of use of LMS as against the traditional face-to-face seems to set some undertones towards actual LMS usage among tutors. Flexibility of use which denotes the degree to which an LMS usage will require less effort and skills in achieving blended learning goals influences the extent to which tutors will use LMS. Davis (1989) views flexibility of use as the easiness of actual use of a new system or technology as perceived by novel users. Individuals exposed to new technologies assess the needed knowledge and skills for operation of these systems for job performance. The likelihood to attach fear towards the new system is actualised when they perceive that usage will require extreme effort and acumen. Within the TAM 3 model, Venkatesh and Bala (2008) demonstrate how computer anxiety is related to how easy usage of a system will be. The anxiety resulting from this perception, will be able to trigger a feeling that inappropriate manipulation of the system (the tendency to press wrong buttons or give wrong commands) as a result of lack of skills or difficulty in usage may cause system failure or defect during usage, and subsequently result in non-achievement of usage results. The notion that the LMS system is difficult to use or otherwise will make tutors emotionally unstable towards its use, causing panic when exposed to it for blended learning purposes. Evidence of this relationship is proven in studies such as by

Parayitam, Desai, Desai, and Eason (2010) and Kim and Forsythe (2008). This negative feeling is enough to raise their anxiety levels towards LMS technology use. Against this background, the study proposes that:

H2: Inflexibility of LMS usage will have an effect on tutors' anxiety towards LMS usage for blended learning.

### *Relationship between colleague influence and LMS anxiety*

Influence exerted by colleagues towards each other, to a larger extent, directs their behaviour towards certain phenomenon. In the technological milieu, the influence by colleagues (positive or negative) is a determinant for whether individual members will use a technology or not. Colleague influence, which is also known as social norm or influence, explains the extent to which the advice of referent or important others determine whether individuals should use a relatively new technology or not (Venkatesh et al., 2003). In a typically traditional pro setting such as the classroom, where orthodox means are utilised in obtaining instructional goals, the introduction of LMS or any other educational technology system is likely to be met with some amount of hostilities towards usage. Especially, when usage is deemed difficult or incompatible with routine tasks, colleagues are likely to negatively influence each other towards employing the system for instructional purposes. There is the tendency to 'pollute' or ill-advise member tutors or create myths about the system. A particular myth is to project system failure towards instructional or educational goals and a waste of time and efforts or a fragility of the system towards damage when improperly used. These myths by colleagues are enough to create certain fears in tutors towards LMS use. Subconscious thoughts on the possible system failure towards achieving intended goals or damage when improperly used may create in tutors some levels of anxiety towards LMS use for blended learning. According to Argyle (1994), every social (in this case, reaction towards technology) act is seen as a response to the preceding act of another individual. Against this backdrop, the study proposes that:

H3: Negative influence by colleagues will have an effect on tutors' use of LMS for blended learning.

### *Relationship between use support and LMS anxiety*

Support towards LMS use or any novel technology is much anticipated by potential users during actual usage. User perceptions of availability of support differ from accessibility of support for use behaviour. Support in technology use may be defined in this study as the all enhancing elements or actions provided for individuals or tutors by administrative or technical staff towards LMS usage. Akin to facilitating conditions, Venkatesh et al. (2003) defined this variable to be the degree to which enabling conditions or environment exists to promote the use of a new system. The perceptions of such external controls, which cover organisational resources and technical support structure (Venkatesh & Bala, 2008), have direct effects towards the ease of usage of LMS and reduce individual technology anxiety tendencies towards usage of such technologies. The lack of support during usage, especially when users get stuck in the middle of

system usage and either need advice or direction on what to do or where to navigate, is likely to create anxiety in users. The fear of pressing a wrong button or key to curb a particular system problem or to perform a particular task may serve as a deterrent towards usage. This could cause new users to have a certain level of phobia towards LMS technology use and further prevent them from using it. Based on the foregoing discussion, the study predicts that:

H4: Lack of tutor support for the use of LMS will have an effect on tutors towards LMS use for blended learning.

### *Relationship between LMS anxiety and actual use*

Technology-related fear exhibited by individuals has an adverse effect on actual usage of the system for job-related tasks towards achievement of job-related goals. Actual usage or use behaviour refers to the practical application of a system for job performance gains (Davis, 1989). In their study on anxiety and technology use, Sisman, Yoruk, and Eleren (2013) demonstrated how the effect of anxiety influences the use of online technology tools. When a new technology generates in potential adopters a sense of fear (resulting from both technological and personal perspectives), they are unlikely to employ it for job-related purposes but rather stick to their traditional methodology. On the other hand, if the introduction of a novel system and in this instance LMS creates in tutors a sense of confidence towards usage for blended learning, then usage levels will be high. For instance, Alenezi, Abdul Karim, and Veloo (2010) in their study on students' intention to use e-learning found a significant relationship between their computer anxiety expressions and actual use of e-learning. This was supported by findings from Adetimirin (2015) who looked at post-graduate students' anxiety as related to online discussion forums. Thus the behavioural output of fear towards LMS relates negatively with actual use behaviour. In view of this, the study hypothesises that:

H5: Anxiety of tutors towards LMS will have a negative effect on their actual usage of LMS for blended learning in distance education.

The formulated hypothesised relationships for the study are conceptually depicted by Figure A3.

## **Research method, results and findings**

### *Research design*

A quantitative design was employed for this study, with the questionnaire as the main data collection instrument. Three sections characterised the questionnaire, which were mainly on demographic variables, independent variables and dependent variables. The demographic section elicited response by way of gender, age and face-to-face experience, while the independent variable section comprised of outcome expectation, flexibility of use, colleague influence and use support. The last section was on technology anxiety and actual usage, which were mainly the dependent variables of the study. The

questionnaire items totalling 32 were anchored on a 5-point Likert scale. The detailed questionnaire can be referred from [Table A7](#) in appendix 2. These items were modified from authors such as Khechine, Lakhali, Pascot, and Bytha (2014); Venkatesh et al. (2003); Park (2009); Butler (2010); Al-Alak and Alnawas (2011). The context of use of LMS in this study was mainly for online forum discussions before and after face-to-face sessions; uploading and sharing learning resources before and after face-to-face sessions; announcements on teaching and learning activities before and after face-to-face; video-conferencing; provision of links to additional online resources for students after face-to-face sessions.

The study targeted a population size of about 1500 distance education tutors who were located at sixty distance learning centres across Ghana. However, the population that could be accessed comprised 400 tutors who formed part of the piloting process of the Fronter LMS for blended learning project. A cluster sampling technique was therefore used to randomly allocate sub-samples to the various regions and their specific study centres. This method ensured that adequate representativeness was achieved based on a derived sample size of 280 tutors country-wide. The distribution of the 280 questionnaires yielded an outcome of 267, representing a response rate of 95.4% that were filled and returned. Final screening was made and the responses were entered into Statistical Package for the Social Sciences (SPSS) version 21 software, which were later exported as a comma separated values (csv) file into Smart PLS software 3.2.6 for final statistical analysis.

## Results and findings

### *Respondents' profile*

The profile of respondents was initially analysed. [Table A1](#) provides this information. From [Table A1](#), based on the gender profile, 164 males representing 61.4% and 103 females with a percentage of 38.6% made up the total of the 267 tutors. The age demographic was between below 35 years to 56 years and over. Tutors' traditional face-to-face experience in distance education was about 5 years to 11 years and over. The implication of the results of the personality profile of the respondents from the table is that, there were relatively more male respondents than their female counterparts. Age wise, those who fell in the category of 36–45 obtained the highest frequency (102) with 38.2% out of the total percentage. The least group (56 years and above) had the least tally representing only 12.7%. In terms of number of years of experience gained in traditional face-to-face experience, the majority group were those tutors with 6–10 years of experience. Their number was 112, with a percentage of 42.0% out of the total sample.

### *Results for model*

The study utilised the SmartPLS 3.2.6 software for the statistical analysis for the proposed model (measurement and structural model components). According to Hair, Sarstedt, Ringle, and Gudergan (2017), the Partial Least Squares Structural Equation Modelling (PLS-SEM) approach requires a two-stage evaluation. This involves the assessment of the outer model for reliability and validity, and the inner model for relationship testing and associated



significance. As a recommendation, reflective hypothesised models are evaluated based on validity and reliability as well as path analysis, coefficient of determination, effect size, predictive relevance, confidence intervals and the importance-performance map analysis (IPMA) (Hair et al., 2017).

### *Assessment of structural model*

The procedure for assessing the structural model is to analyse for associated relationships and significance of path coefficients, coefficient of determination, *t*-statistics, effect sizes, predictive relevance, the confidence intervals for significant relationships and finally IPMA (Hair et al., 2017).

### *Path analysis and hypotheses testing*

A bootstrapping process of 5000 samples was used to correct for non-normality, as recommended by Hair et al. (2017) and Kline (2015), in calculating the significance of hypotheses raised in this study. Figure A4 presents the graphical results of the bootstrap, while Table A2 shows the statistics. From Table A2, the beta coefficients and *t*-statistics suggest that three constructs, colleague influence ( $\beta = 0.30$ ;  $t = 4.22$ ,  $p < 0.01$ ), outcome expectancy ( $\beta = -0.18$ ;  $t = 2.82$ ,  $p < 0.01$ ) and use support ( $\beta = -0.19$ ;  $t = 2.55$ ,  $p < 0.01$ ), had a direct relationship with LMS anxiety, with their relationships being very significant. However, flexibility of use was insignificant ( $\beta = -0.02$ ;  $t = 0.31$ ,  $p > 0.01$ ) though had a negative direct relationship with LMS anxiety. The relationship between LMS anxiety and actual use was negative but significant at  $p < 0.01$  with a corresponding beta and *t*-values of  $-0.22$  and  $3.94$ , respectively. Figure A4 depicts the bootstrapping results.

### *Importance performance analysis (IPMA)*

Importance performance analysis proved that for LMS anxiety of tutors, colleague influence was very critical as the variable was the highest ranked important determinant justified by the importance index of 0.31 as indicated by Table A3. However, the highest performing indicator was outcome expectancy with a performance index of 73. The least important variable was flexibility of use (performance index;  $-0.01$ ). The graphical result of the IPMA is depicted by Figure A5.

### *Assessment of the measurement (outer) model*

Validity and reliability assessments for the reflective model were based on the convergent validity; average variance extracted and item loadings. From Table A4, the PLS Algorithm results yielded outer loadings ranging from 0.70 to 0.95, all higher than the threshold of 0.708 (Hair et al., 2017). However, after the PLS algorithm for Confirmatory Factor Analysis, items with low loadings of below 0.5 were deleted in accordance with the guidelines from Kline (2015) and Hair, Sarstedt, Hopkins, and Kuppelwieser (2014).

The outer model yielded composite reliability values ranging from 0.80 to 0.91. These values were all higher than the 0.7 criterion (Hair et al., 2017). In satisfying the criteria for the average variance extracted estimates, the individual constructs had values of between 0.63 and 0.77, which were greater than the minimum acceptable value of 0.5

(Hair et al., 2017). The statistics obtained for the measurement model indicates that validity and reliability standards were achieved.

### **Multicollinearity**

Kock (2016) and Hair et al. (2017) recommended that to detect multicollinearity (both lateral and vertical) in PLS-SEM, a more effective procedure is to run a full collinearity test based on Variance Inflation Factor (VIF) values. Obtained figures of less than 3.3 represent a perfect result. Table A5 shows that the results of the collinearity assessment yielded VIF values between 1.0 and 1.99. The results proved that the independent latent variables measured distinctively from their corresponding dependent variables. This is indicative that the measurement is free from common method bias and collinearity effects.

### **Heterotrait-Monotrait ratio (HTMT)**

Henseler, Ringle, and Sarstedt (2015) present a more rigorous measure of discriminant validity as the HTMT. By way of explanation, it represents the product of the average correlations of the indicators across constructs measuring different phenomena relative to the average of the correlation of the indicators within the same construct, thus the ratio of the between-trait correlations to the within-trait correlations (Hair et al., 2017). The HTMT is deemed strict when values are less than 0.85. However, a more acceptable value is less than 0.90. From the results obtained, the HTMT as shown in Table A6, values of the constructs were between 0.14 and 0.74, all less than the 0.85 strict criterion. This implies that the model satisfied the HTMT by a strict standard.

### **Discussion on findings**

Outcome of the hypotheses postulated within this study revealed that three possible variables determined tutors' anxiety towards LMS usage. This comprised their perception of the outcome of use of LMS, support surrounding LMS usage as well as influence from colleagues. The positive relationship between colleague influence and LMS usage anxiety indicates that as individual tutors are influenced more and more by peers towards the usage of LMS, they are likely to feel more anxious towards the actual usage of the system. The situation could be exacerbated when the influence is highly negative. This is especially possible in the event of an introduction of the new system within the distance framework to be employed for blended learning, when the norm has been face-to-face. This result agrees with Argyle (1994) that resultant behaviour of individuals is a product of a preceding influence of another individual. Thus, colleagues have the potential to input some levels of fear into their fellow tutors towards LMS use especially in situations where individual tutors have less experience with LMS technology as in the case of distance tutors within this study. This makes it necessary for mechanisms to be put in place to incite positive influence from colleagues towards their peers when it come to the uptake of LMS for blended learning.

Another key determinant of LMS anxiety was the expectations of tutors on the outcome of usage. The relationship between this variable and that of LMS anxiety was

significantly negative, a result resonating with that of Jon-Chao et al. (2012). This implies that when outcome expectations (such as accomplishing tasks more quickly, promoting various teaching strategies, making teaching and learning more meaningful, etc.) of tutors in distance education towards LMS usage is high, then, their anxiety levels will be low. They are likely to believe that usage of LMS for distance education blended-learning delivery will yield positive results for their pedagogical practices and hence will fit into their current practice. However, if tutors have a perception that the use of LMS may not be able to meet their pedagogical expectations, they will tend to perceive LMS usage as a waste of time and resources without achieving the purpose for which they were intended upon usage. This situation has the tendency to create anxiety in tutors as to whether the system will work or achieve their goals of usage, a situation which normally emanates from system failure and other system-usage-related constraints.

Additionally, support for LMS usage has been a crucial element in LMS success indicators. Within this study, a significant relationship was obtained between use support and anxiety levels of tutors in distance education. The negative direction of their relationship points to the fact that a highly perceived LMS-use-related support (such as necessary knowledge, resources for use, technical support, etc.) by tutors will tend to reduce their anxiety feelings towards LMS usage. The reverse will be the case if tutors perceive that the support needed to utilise LMS for blended learning in distance education is either non-available or available but inaccessible. The fear of getting stuck in the middle of usage without a ready support facility in place (such as technical support team, etc.) has the tendency to generate user anxiety in tutors when attempting to utilise LMS for distance education delivery. According to Venkatesh and Bala (2008), when individuals perceive that organisational resources and technical support exist towards technology usage, perception towards easiness is positive. This reduces the anxious expectations of potential users of technology. The notion that 'help' is unavailable or inaccessible could be enough to generate fear towards LMS usage.

Although flexibility of use was not a factor towards tutors' LMS anxiety, there was a possible relationship with the variable. Within this study, tutors did not consider the flexibility of use of LMS to create anxiety in them which is not in tandem with findings from Parayitam et al. (2010) and Kim and Forsythe (2008). This may be partly attributable to the relationship that may exist between use support and flexibility of use. The implication of this is that if support for LMS use is available, it will make usage of the system flexible and vice versa. Meaning, the flexibility or otherwise of LMS usage by tutors may be highly dependent on the support available for use. There could be a possible indirect relationship between flexibility of LMS use and anxiety by way of a mediating effect of use support.

Additionally, technology anxiety was negatively related to actual technology use, with the relationship being significant. This finding relates with results from Sisman et al. (2013). Tutors associated their LMS anxiety with the level of usage or avoidance of LMS for pedagogical or information sharing purposes. This is implied by the negative relationship which presupposes that if distance education tutors feel highly anxious towards LMS, there is the likelihood that their usage levels will be either low, infrequent or may totally avoid usage of LMS for blended learning. However, the opposite will be realised when anxiety behaviour towards LMS is minimal or non-existent, a result that

agrees with that of Alenezi et al. (2010) and Adetimirin (2015). This situation will promote copious or frequent usage of LMS for student interaction and sharing of information and other resources to promote effective online delivery.

The results from the analysis of the important-performance index proved that for LMS anxiety determination amongst tutors in distance education, the most important variable to be considered is the influence from colleagues. This variable was the key in determining the extent to which tutors could feel anxious towards LMS usage for blended learning. Tutors ranked as high the influence from their colleagues in promoting anxiety tendencies in them towards LMS. This was followed by their outcome expectations to be derived from using LMS, which may be based on the system reliability and how the system use will reward their effort of using it by way of providing desired results for teaching and learning. However, they ranked as low, by way of importance, flexibility of LMS usage in generating anxiety in them, mainly because of the possible influence of use support which could be an antecedent of how flexible LMS usage will be. However, in terms of variable performance towards LMS anxiety, outcome expectation was the highest performing factor. This resonates the assertion by Venkatesh et al. (2003) that users of new technology often weigh as valuable the gains to be achieved in using a particular technology for job tasks.

Finally, the unidimensionality of the confidence intervals of the significant relationships indicates that the results are very strong and valid, which can be highly depended upon for theory, policy and practice. The relationships between colleague influence, outcome expectation of LMS usage and use support with LMS-related anxiety and usage provide a new direction on how anxiety levels could be reduced by way of the knowledge or significance of predicting variables and their effect on actual usage of LMS-enabled blended learning for distance education delivery. The aforementioned variables act as stimuli which generate responses from tutors in relation to LMS usage anxiety, coupled with a resultant behaviour towards actual LMS utilisation for blended learning practices in distance education delivery.

## Conclusion

This study looked into the possible antecedents of LMS technology anxiety based on a technology-related stimulus-response theory, taking into consideration actual factors surrounding utilisation of LMS for distance learning. It further assessed the most important as well as performing factors determining distance education tutors' LMS-technology-related anxiety towards actual usage of this system. Outcome expectancy, influence from colleagues and support for LMS usage were important factors in determining tutors' anxiety behaviour towards the use of LMS for blended learning in distance education. The results indicate that priority should be given to the aforementioned factors in order to help reduce drastically or totally eradicate LMS-related anxiety in tutors towards the usage of this technology for blended learning in distance education.

The study advances a new framework (TR-SR-TF) for assessing technology-related anxiety, which can be applied widely in other fields of technology use other than educational technology alone. Based on the outcome of this study, it is implied that aside from other personality factors that influence individual anxiety towards technology, certain

factors related to direct usage are also responsible for creating LMS-related anxiety. The study further provides a leapfrogging attempt to addressing the issue of technology-related anxiety from another perspective, which can be widely applied in other fields in assessing LMS and other technology-related anxiety that should be included in model formulation. The study has also proven that it will be apt for theoretical consideration to be given to the relationship between LMS-related anxiety and actual use of technology and not intentions towards behaviour alone.

The effect of colleague influence was identified as one of the reasons for LMS usage anxiety amongst distance education tutors. Based on this result, management has to provide positive orientation to all tutors at the same forum, educating them on the positive need of employing LMS for distance education delivery.

The system should be made very reliable by way of constant internet supply, quality output delivery, system update and maintenance to make it effective in achieving teaching and learning goals that have been targeted for by tutors, to boost their confidence in using the system to perform their educational tasks.

Additionally, the needed support provided by technical teams, management support by way of incentives and usage gadgets, must be made readily available to tutors to facilitate the usage of the system, which will ultimately make it easier to use.

The above considerations will help eliminate LMS-related anxiety and promote effective usage of LMS for blended-learning in distance education.

It is recommended that future studies emphasise on the moderating effects of gender, location and course taught by tutors on the effect of the predictors of LMS related anxiety. It is also recommended that future studies test for the possible relationship between flexibility of use and use support to ascertain its significance. Further mediating effect of use support on flexibility of use towards LMS anxiety should also be tested for significance. There could also be a comparative research between full time university lecturers in mainstream tertiary education campus and their counterparts in the distance mode to assess for variance in determinants of their LMS-related anxiety. Finally, since previous studies have not considered the postulations within this study, it can be replicated to further prove the significance of the relationships of the predictive variables and technology-related anxiety.

## Limitations

The study limited the subjects to distance education tutors, but could be extended to all university lecturers. It also did not test for possible relationship between flexibility of use and use support. Additionally, the study omitted the test for possible mediating effect of use support on flexibility of use towards LMS-related anxiety.

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## Appendix 1

**Table A1.** Respondents’ profile.

Profile	Frequency	Percentage
Gender		
Male	164	61.4%
Female	103	38.6%
Age		
(≤35)	67	25.1%
(36–45)	102	38.2%
(46–55)	64	24.0%
(≥56)	34	12.7%
Face-to-face Experience		
(≤5yrs)	98	36.7%
(6–10yrs)	112	42.0%
(≥11yrs)	57	21.3%

**Table A2.** Analysis of inner model.

Hypotheses	Relationship	Std. Beta	Std. Error	t-Value	Decision	f <sup>2</sup>	Q <sup>2</sup>	CI	
								LL	UL
H1	OE -> LANX	-0.18	0.066	2.82***	S	0.03	0.30	-0.61	-0.22
H2	FOU -> LANX	-0.02	0.078	0.31	NS	0.00		-0.15	0.14
H3	CI -> LANX	0.30	0.073	4.22***	S	0.09		0.17	0.41
H4	US -> LANX	-0.19	0.076	2.55***	S	0.03		-0.34	-0.06
H5	LANX -> AU	-0.22	0.057	3.94***	S	0.06	0.21	-0.31	-0.09

*p* ≤ 0.01\*\*\*; S = Supported; NS = Not Supported; f<sup>2</sup> = Effect Size; Q<sup>2</sup> = Predictive Relevance; CI = Confidence Interval; LL = Lower Level; UL = Upper Level

**Table A3.** Importance Performance Analysis (IPMA) for LMS anxiety.

Constructs	Importance Index	Performance Index
CI	0.31	53.88
FOU	-0.01	68.57
OE	-0.26	73.07
US	-0.19	59.05



**Table A4.** Construct reliability and validity.

Constructs	Items	Outer loadings	Cronbach's Alpha	Composite reliability	Average Variance Extracted (AVE)
Actual use	AU1	0.84	0.88	0.90	0.74
	AU3	0.90			
	AU4	0.86			
	AU5	0.84			
Colleague influence	CI1	0.95	0.76	0.83	0.77
	CI3	0.72			
	CI4	0.70			
Flexibility of use	FOU1	0.82	0.84	0.89	0.67
	FOU2	0.76			
	FOU3	0.85			
	FOU4	0.84			
LMS anxiety	LANX2	0.82	0.87	0.90	0.72
	LANX3	0.90			
	LANX4	0.91			
	LANX5	0.77			
Outcome expectation	OE1	0.83	0.90	0.91	0.67
	OE2	0.80			
	OE3	0.85			
	OE5	0.84			
	OE6	0.86			
	OE7	0.77			
	US1	0.70			
US2	0.95				
US5	0.72				

AVE = (summation of squared factor loadings)/(number of construct's items).

Composite reliability = (square of the summation of the factor loadings)/[(square of the summation of the factor loadings) + (square of the summation of the error variances)]; (Yeap, Ramayah, & Soto-Acosta, 2016), Hair et al., 2014).

**Table A5.** Collinearity statistics.

Constructs	AU	CI	FOU	LANX	OE	US
AU						
CI				1.18		
FOU				1.99		
LANX	1.00					
OE				1.71		
US				1.43		

**Table A6.** HTMT.

Constructs	AU	CI	FOU	LANX	OE	US
AU	<b>0</b>					
CI	0.30	<b>0</b>				
FOU	0.50	0.49	<b>0</b>			
LANX	0.27	0.15	0.14	<b>0</b>		
OE	0.47	0.36	0.74	0.22	<b>0</b>	
US	0.53	0.63	0.65	0.16	0.49	<b>0</b>

Heterotrait-Monotrait Ratio (HTMT), which is the average of the correlations of indicators across constructs measuring different phenomena relative to the average of the correlations of indicators within the same construct (Henseler et al., 2015).

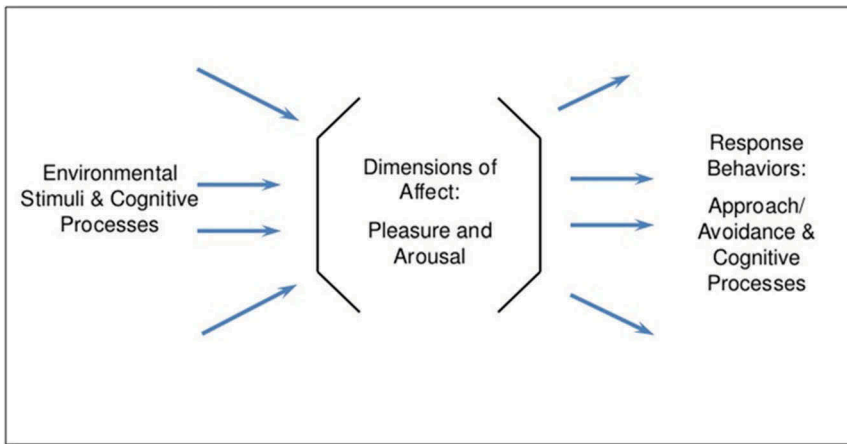


Figure A1. The Mehrabian–Russell stimulus-response model.

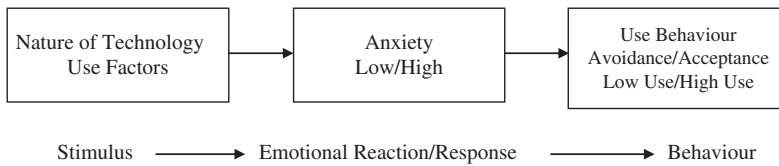


Figure A2. Technology related stimulus-response theoretical framework (TR-SR-TF) modified from Mehrabian and Russell (1974).

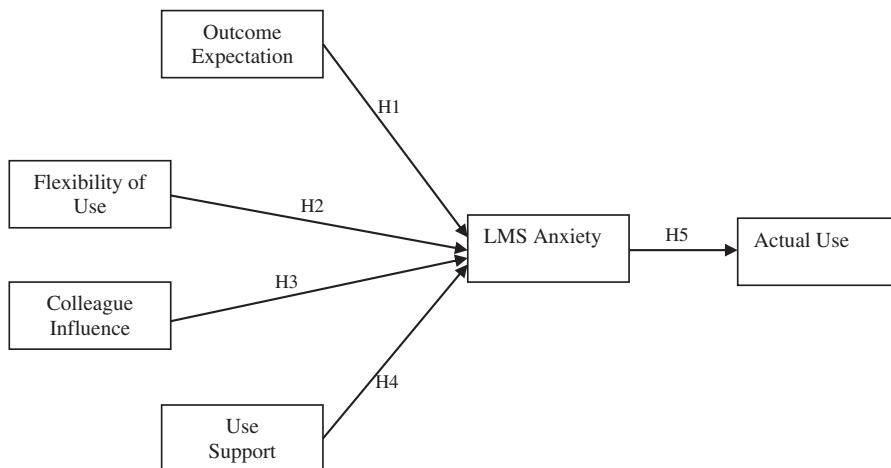


Figure A3. Conceptual model.

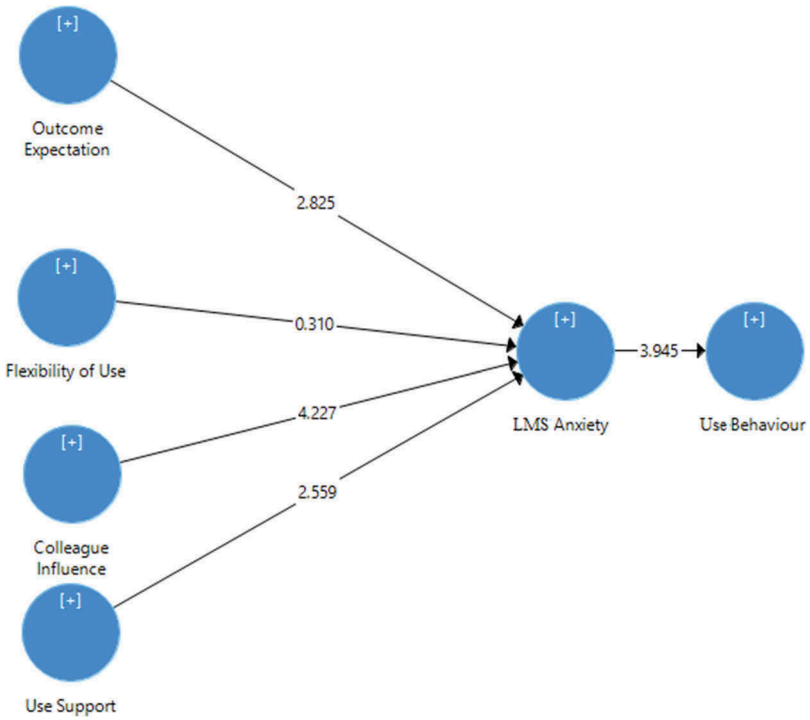


Figure A4. Bootstrapping results for model.

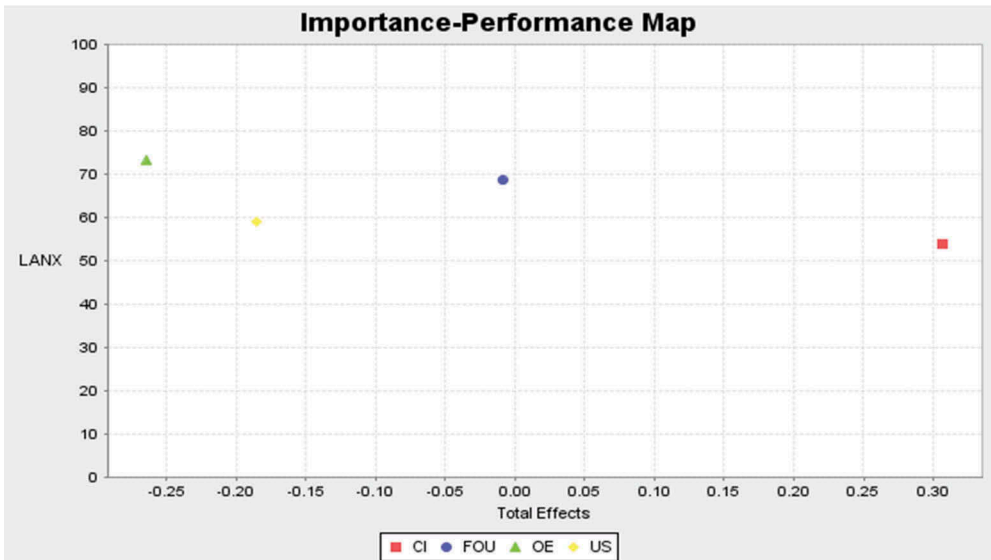


Figure A5. Importance performance map analysis.

## Appendix 2. Questionnaire Items.

Table A7.

Constructs	Items
Outcome expectation	<p>I find the system useful to support face-to-face in my teaching and learning process.</p> <p>Using the system enables me to accomplish tasks more quickly than only face-to-face.</p> <p>Using the system together with face-to-face increases my teaching and learning output.</p> <p>Using the system in addition to face-to-face increases my chances of getting a promotion.</p> <p>The system allows me to use various teaching strategies and approaches than only face-to-face.</p> <p>Using the system's online resources improves the quality of my teaching and learning activities and makes my work more meaningful than face-to-face alone.</p>
Flexibility of use	<p>Using the system in addition to face-to-face increases my teaching allowance incentive.</p> <p>My interaction with the system to augment face-to-face is clear and understandable.</p> <p>It is easy for me to become skilful at using the system together with face-to-face over time.</p> <p>Currently, I find the system easy to use to support the face-to-face teaching approach.</p> <p>Learning to operate the system to support face-to-face is easy for me.</p>
Colleague influence	<p>Colleagues who influence my behaviour think that I should use the system in addition to face-to-face.</p> <p>Colleagues who are important to me suggest that I should use the system to support face-to-face.</p> <p>In current practice, tutors who use such systems together with face-to-face are seen as technologically good instructors.</p>
Use support	<p>In general, my colleagues encourage for the combined use of the system and face-to-face.</p> <p>I have been provided with the resources necessary to use the system in addition to face-to-face.</p> <p>I have been provided with the knowledge necessary to use the system to support face-to-face.</p> <p>In general, management has provided enough support towards the use of the system, together with face-to-face interaction.</p> <p>When I am in difficulty in utilising online activities to support face-to-face, the system's support team is available for assistance.</p>
LMS anxiety	<p>It scares me to think that I could lose a lot of information using the system by hitting the wrong key while online with students, if I don't get assistance.</p> <p>I feel apprehensive about using the system in addition to face-to-face interaction because the system may fail, resulting in my inability to achieve teaching and learning outcomes.</p> <p>I hesitate to use the system for fear of making mistakes I cannot correct while online with students, due to lack of technical support.</p> <p>The system is somewhat intimidating to me in terms of using it to support face-to-face instruction due to negative remarks by colleagues.</p> <p>I am afraid that the use of the system in addition to face-to-face will eventually replace the course tutor in the future.</p>
LMS use behaviour	<p>I use vCoDE (the system) for online forum discussions after face-to-face.</p> <p>I use vCoDE for announcements on teaching and learning activities before and after face-to-face.</p> <p>I use vCoDE for uploading and sharing learning resources before and after face-to-face sessions.</p> <p>I use vCoDE for video-conferencing to support face-to-face interaction.</p> <p>I use vCoDE for providing links to additional online resources for students after face-to-face sessions.</p>