





highly flexible and feature rich. Flexibility is the ability to (a) easily upload and download learning content and related resources in and out of LMS, and (b) customize applications to meet specific needs of users

## 2.2. Technology Acceptance Model

The theoretical framework for this study was the Technology Acceptance Model. TAM is a model popularly known to be used to check possible acceptance of technology. It was first created by Fred Davis and Richard Bagozzi [11]. It tries to explain why people would choose to use a particular technology in a work context. TAM states that they do so because they find the technology useful for their work and easy to use. [11] proposed TAM to explain the casual links between beliefs (usefulness of a system and ease of use of system) and users' attitudes, intentions, and actual usage of the system. Thus, TAM proposes that user's beliefs are predictors of user attitude towards using the technology, behavioral intentions to use and actual usage. The original TAM is shown in Figure 1. TAM concepts are:

- Perceived Usefulness (PU) – the degree to which a potential user believes that using the technology would enhance his or her work performance,
- Perceived Ease of Use (PEOU) – how effortless a potential user believes using the technology will be,
- Attitude Toward Using (ATU) – a potential user's positive or negative feeling associated with performing a specific behaviour, and
- Behavioral Intention to Use (BI) – the degree to which a potential user has formulated conscious plans to perform or not perform some specified future behaviour.

Both PU and PEOU are considered distinct direct determinants of ATU, hence they are affected directly by system design. TAM further proposes that PEOU influences PU, and PU directly affects BI. Finally, the user's attitudes towards using the technology determines the behavioural intentions to use the technology. BUAN has not started using Moodle yet, so the research model employed in this study (see Figure 2) excluded actual system use. External factors considered were age, gender, academic qualification and teaching experience.

Several studies have applied TAM as a ground theory to efficiently explain and predict the acceptance of technology. It was used to investigate acceptance of healthcare [12], email [13], World Wide Web [14], search engines [15], mobile banking [16] and many others. When TAM is applied in education, literature shows mixed results on the

impact of the different TAM constructs on technology acceptance.

TAM was used by [2] in a survey on lecturers' attitudes towards Moodle in a Jordanian university. From the findings, only 18.8 % of the participants believed that it will be easy to upload teaching and learning materials into Moodle, while 27.5 % believe it will be a lot of work thus not easy. Here PEOU was found not to be a significant predictor of intention to use Moodle. This is consistent with findings from a study by [17], that showed PEOU did not have a significant influence on student attitude or intentions towards using Internet-based learning medium.

PEOU was found to have a significant effect on intention to use and on attitudes to use in a study conducted by [18]. They surveyed exploring students' acceptance of e-learning using TAM, and in their findings students who find e-learning system easy to use could clarify this and may find the system useful. The findings also revealed that PU has significant effect on intention to use but not on attitudes to use. This may be because it was found that in their willingness to adopt e-learning system students were only driven by its benefits.

[19] showed PU to be a significant positive influence on student teachers' attitude towards computer use and behavioural intention. Moreover, PEOU was found to significantly influence PU, and attitude towards computer use to influence behavioural intention. In [20]'s study that investigated the perceived convenience in acceptance of English mobile learning using TAM, attitude towards use was significantly influenced by both PU and PEOU. Furthermore, PU and attitude towards using were found to have a direct influence on continuance of intention to use. Overall, their extended TAM was effective at predicting and explaining the acceptance of mobile learning.

## 2.3. Study Hypotheses

Existing literature shows that PEOU is a positive determinant of PU (e.g. [5] and [17]), therefore the following hypothesis is proposed:

*H1: PEOU will have a positive effect on the PU.*

Many studies also show that both PU and PEOU are significant determinants of attitude to use a system (e.g [3], [2] and [5]), so the researchers propose the following hypotheses:

*H2: PU will have a positive effect on BUAN lecturers' attitudes towards using Moodle.*

*H3: PEOU will have a positive effect on BUAN lecturers' attitudes towards using Moodle.*

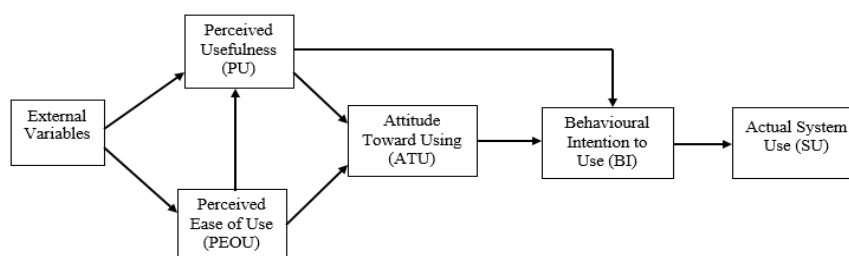


Figure 1. Original Technology Acceptance Model [11]

As reported by [17], PU is the most important predictor of intention to use a system. According to [5] PEOU has also influenced intention to use a technology. Therefore, the following hypotheses are proposed:

*H4: PU will have a positive effect on BUAN lecturers' intention to use Moodle.*

*H5: PEOU will have a positive effect on BUAN lecturers' intention to use Moodle.*

Several other studies have demonstrated that attitude towards using a system is a direct determinant of behavioural intention to use technology (e.g.: [5], [3] and [2]). Therefore, the following hypothesis is proposed:

*H6: ATU will have a positive effect on BUAN lecturers' intention to use Moodle.*

Taking the above hypotheses into consideration, this study's research model was proposed as shown in Figure 2.

### 3. Research Methodology

To test the six (6) stated hypotheses a quantitative survey was performed. This section discusses this survey in terms of the development of the data collection instrument, the sampling process, data collection and analysis approach used.

A paper-based questionnaire was used to collect data from the study's test subjects, who were BUAN lecturers. The questionnaire was developed on the basis of the literature review. In order to reduce the measurement error, the questionnaire was developed as follows: First, a pre-test of the questionnaire was performed. The main goal of the pre-test was to improve the content of the measuring items, hence the questionnaire was given to two BUAN lecturers from, one from Statistics Unit and another one from the Educational Technology Unit, to improve face and content validity. From feedback gotten from the pre-test, wording was refined for some few items. Next stage, a pilot test of the study was performed with 12 BUAN lecturers (2 each from the

university's 6 lecturers departments) who were not part of the sample. The main purpose of the pilot test was to empirically check whether or not the questionnaire lacked accuracy or precision. The test re-test procedure of reliability measurement was used. In this procedure, the same instrument was administered on two different occasions to the same individual and the responses correlated. The pilot test results confirmed a solid reliability for all measurement items. The questionnaire consisted of the following sections:

Section A – characterisation of the participants in terms of age, gender, academic qualification and teaching experience.

Section B – consisted of questions formulated based on knowledge and usage of ICT.

Section C – consisted of questions that sought opinions on possibility of acceptance of Moodle. The questions in this section were organized according to the TAM constructs of PEOU, PU, ATU and BI, adapted in the context of Moodle.

Questions in sections B and C were structured using a five-point Likert-type scale designed as follows: 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly Disagree. The participants were asked to rate their level of agreement to closed questions using this scale. A copy of the questionnaire can be obtained by email from the authors.

The estimated number of lecturers at BUAN is 100 and the researchers wanted a study population of sixty (60); ten lecturers from each of the six academic departments. This sample size represents 60 % of the total population. Due to several reasons, only fifty (50) lecturers participated in the study. A simple random sampling was used to select the 50 participants. Simple random selection without replacement was used and it allowed the researchers to decide who to sample based on the problem under study. Simple random sampling was then carried out in all the 6 lecturers departments to pick at most 10 participants. The researchers sought the permission from Dean of Faculty of Agriculture to administer questionnaires. The researchers also sought the

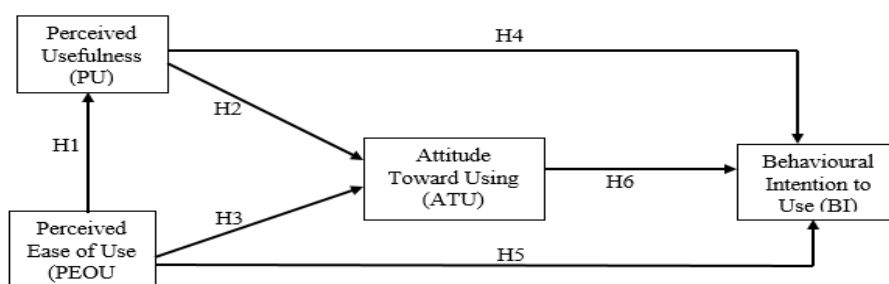


Figure 2: The Research Model

consent of the research participants. As such, requests for participation in the survey was sent to the selected lecturers through the office of the Dean of Faculty of Agriculture. Participants were assured of confidentiality for their responses and that they were not to write anything on the questionnaires that would reveal their identities. There is always a possibility of a sampling frame error due to self-selection of participants in the study, and only those that were interested responded, hence 50 participants instead of 60.

The questionnaires were self-administered by the researchers to collect data. This allowed personal contact between researchers and participants for the researchers to fully explain the purpose of the study. Moodle is not yet implemented at BUAN, so the researchers set up a trial of Moodle in one of the university computers and asked participants for both the pilot and main study to log onto Moodle and explore it before answering questions. This was so that they could at least have some appreciation of Moodle. The questionnaires were collected after seven (7) days. All the questionnaires were returned and deemed useful for analysis because there were no cases of missing data. This gave a response rate of 100%. After data was collected, it was fed into an Excel spreadsheet (2013 version) and organised before being imported to the Statistical Package for the Social Sciences (SPSS) version 2023. Excel was used to analyse data on participants' Moodle knowledge and usage. SPSS was used to test the relationship between TAM's constructs. Pearson's correlation method and regression tests were conducted to evaluate the strength of the relationships between these constructs. Descriptive statistics were used to summarise and interpret the data collected from the participants. These statistics included frequencies, means and the spread of data measured through standard deviations.

## 4. Results Presentation, Analysis and Discussion

### 4.1. Demographic Characteristics

Looking at the participants' demographic profiles as shown in Table 1, responses were received from

33 males and 17 females, giving 66% and 34% respectively. The average age of participants was 45.9 years old, being minimum 30 years old and maximum 59 years old. The university requires a minimum qualification of Masters' degree for a lecturer. As can be seen from Table 1, majority of participants have a doctoral degree (60%). In terms of tertiary teaching experience, majority of the participants have been teaching for 16 to 20 years. Thus, according to Table 1, a typical lecturer at BUAN is a male of 41 to 50 years, with tertiary teaching experience of 16 to 20 years and holding a doctoral degree.

### 4.2. ICT Usage

The results captured in Table 2 show that all participants have computer access at the university and all upload notes on the student portal. Although 96% of participants communicate academic work with their colleagues through email, only 78% use email to communicate academic work with students. 86% of participants reported to have social media access and 76.7% use social media to present academic to their students. A bigger number of participants (88.4%) reported to communicate academic work with colleagues through social media. Majority (92%) of participants use PowerPoint to teach and only 24% use interactive boards available in the university. Lastly, only 8% of participants reported to have used Moodle before this study. These results show that the BUAN has technology that lecturers use to communicate with colleagues and students, but that do not utilise the interactive technology available. The results also indicate that lecturers have had minimal contact with Moodle as they report to have never used it before this study.

### 4.3. Moodle Usage

Results in Table 2 also shows that participants have not used Moodle before this study, hence did not know how to start Moodle page. This is backed by the negative response rates of 72% and 74% respectively. Nevertheless, after participants interacted with the Moodle trial that was set up for

Table 1. Profiles of the Participants

Characteristics		Frequency	Percentage (%)
Age	Below 31 years old	2	4
	31 – 40 years old	8	16
	41 – 50 years old	23	46
	Above 50 years old	17	34
Gender	Male	33	66
	Female	17	34
Academic Qualification	Master’s Degree	20	40
	Doctoral Degree	30	60
Tertiary Teaching Experience	Below 6 years	11	22
	6 – 10 years	4	8
	11 – 15 years	4	8
	16 – 20 years	21	42
	Over 20 years	10	20

Table 2. ICT Integration and Moodle usage

	ICT Usage	Frequency	Yes (%)	No (%)
1	Do you have access to a computer at university?	50	100	0
2	Do you upload learning material on the student portal (student drive)?	50	100	0
3	Do you communicate academic work with students through email?	50	78	22
4	Do you communicate academic work with colleagues through email?	50	96	4
5	Are you on social media? e.g Facebook, Twitter, Instagram, etc.	50	86	14
6	Do you communicate academic work with students through social media?	43	76.7	23.3
7	Do you communicate academic work with colleagues through social media?	43	88.4	11.6
8	Do you use PowerPoint to teach?	50	92	8
9	Do you use interactive boards available on the university?	50	24	76
10	It is my first time to use Moodle platform	50	92	8
<b>Moodle Usage</b>				
1	I have knowledge about Moodle	50	28	72
2	I have the ability to start Moodle page	50	26	74
3	I know the best way to use Moodle	50	88	12
4	I know how I will stimulate students to communicate through Moodle	50	70	30
5	I know how I will use Moodle share ideas from other educators	50	66	34
6	I know how to use Moodle to learn from other educators	50	68	32

this study, 88 % believed they will know the best way of using Moodle, which they believe will simulate communication and sharing of ideas between themselves and students. These results indicate that, although BUAN lecturers have little knowledge about Moodle, after their interaction with and appreciation of the platform, they believe it will be useful in their duties and add the interaction part which they have been missing when using available technology to communicate with colleagues and students.

#### 4.4. Results of TAM Correlation Analysis on Hypotheses Testing

Testing the relationships of TAM’s variables helped in examining the validity of the hypotheses given. It also helped in evaluating the strength of these relationships. Table 3 below provides a summary of this analysis.

A significant positive relationship was found between Perceived Ease of Use and Perceived Usefulness, and this supports the hypothesis H1 (significant level = 0.805). Thus, the hypothesis was retained:

*H1: PEOU will have a positive effect on the PU.*

The results also indicate that there is a statistically sufficient evidence regarding the impact of Perceived Usefulness on the attitude of BUAN lecturers to use Moodle. This is shown by support for H2 (correlation coefficient = 0.711), hence the hypothesis was accepted.

*H2: PU will have a positive effect on BUAN lecturers' attitudes towards using Moodle.*

The results also provide support for a significant relationship between Perceive Ease of Use and BUAN lecturers' attitude towards using Moodle. This means the results support hypothesis H3 (correlation coefficient = 0.783).

*H3: PEOU will have a positive effect on BUAN lecturers' attitudes towards using Moodle.*

Hypothesis H4 is also supported by the results as they show a statistically significant relationship between Perceived Usefulness and BUAN lecturers' intention to use Moodle. This is at 0.622 correlation coefficient. Thus, hypothesis H4 is retained.

*H4: PU will have a positive effect on BUAN lecturers' intention to use Moodle.*

The data also indicate support for hypothesis H5. The results show a significant positive relationship between Perceived Ease of Use and BUAN lecturers' intention to use Moodle. This is at 0.673 correlation coefficient. Thus, hypothesis H5 is retained:

*H5: PEOU will have a positive effect on BUAN lecturers' intention to use Moodle.*

Lastly, there is statistical evidence to support hypothesis H6. The results show a significant positive relationship between BUAN lecturers' attitude to use Moodle, and their intentions to use Moodle. This support of hypothesis H6 is shown by 0.805 correlation coefficient. Thus, the hypothesis is retained:

*H6: ATU will have a positive effect on BUAN lecturers' intention to use Moodle.*

To know the degree of possible acceptance of Moodle by BUAN lecturers, and a deeper understanding of participants' perceptions of TAM variables investigated in this study, they are discussed below.

#### **4.5. Perception of Usefulness of Moodle**

Perceived usefulness refers to the lecturers' beliefs that Moodle will enhance their job performance [2]. For a richer understanding of participants' perceptions on the usefulness of Moodle, statistical analysis in terms of frequencies and percentages is shown in Table 4 below. The participants used a 5 Likert scale (i.e. 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly Disagree) to rate their level of agreement on 7 statements about Perception of Usefulness of Moodle. Participants agree with all the statements, with none of them disagreeing that Moodle will be useful for their work. Of the 7 statements the top 3 are; (1) PU7 (96 % of participants both agree and strongly agree, with mean of 1.64), (2) PU1 (94 % of participants both agree and strongly agree, with mean of 1.64), and (3) PU6 (76 % of participants agree and strongly agree, with mean of 2.10). These results indicate a high confidence level by BUAN lecturers that Moodle will be useful in executing their duties. The statements in Table 4 are described as follows:

PU1: Using Moodle will improve the quality of my work

PU2: Using Moodle will give me greater control of my work

PU3: Moodle will increase my job performance

PU4: Using Moodle will reduce the time I spend on unproductive activities

PU5: Moodle will help me accomplish more work that would otherwise be possible

PU6: Moodle will enhance my effectiveness on the job

PU7: Overall Moodle will be useful for my job.

#### **4.6. Perception of Ease of Use of Moodle**

Perceived ease of use refers to the lecturers' beliefs that Moodle will be effortless to use. The participants again used a 5 Likert scale (i.e. 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly Disagree) to rate their level of agreement on 7 statements on perceptions on ease of use of Moodle. The results, in Table 5 below, indicate that 44 % of participants agree that learning to operate Moodle will be easy for them, as compared to only 6 % who say it will not be easy to do so. Operating Moodle means the process of navigating through the platform, login into it and getting the required information [2]. Although participants interacted with the pilot Moodle set up, the time of interaction might not have been enough, as shown by the results of statements PEOU2, PEOU5 and PEOU6, where participants were undecided. During their interaction with the pilot Moodle set up, a lot of functionalities were not

Table 3. Pearson Correlation Analysis

Control Variables			PEOU	PU	ATU	BI
-none- <sup>a</sup>	PEOU	Correlation	1.000	.805	.783	.673
		Significance (2-tailed)	.	.000	.000	.000
		df	0	48	48	48
PU	PU	Correlation	.805	1.000	.711	.622
		Significance (2-tailed)	.000	.	.000	.000
		df	48	0	48	48
ATU	ATU	Correlation	.783	.711	1.000	.805
		Significance (2-tailed)	.000	.000	.	.000
		df	48	48	0	48
BI	BI	Correlation	.673	.622	.805	1.000
		Significance (2-tailed)	.000	.000	.000	.
		df	48	48	48	0

Table 4. Perceived Usefulness of Moodle

Item	Mean	Standard Deviation	Response %					Scale
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
PU1	1.64	0.78	48	46	0	6	0	Agree
PU2	2.40	0.93	12	52	22	12	2	Agree
PU3	2.28	0.99	20	48	18	12	2	Agree
PU4	2.38	1.03	20	40	24	14	2	Agree
PU5	2.20	0.76	16	52	28	4	0	Agree
PU6	2.10	0.74	18	58	20	4	0	Agree
PU7	1.64	0.56	40	56	4	0	0	Agree

Table 5. Perceived Ease of Use of Moodle

Item	Mean	Standard Deviation	Response %					Scale
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
PEOU1	1.98	0.87	32	44	18	6	0	Agree
PEOU2	2.48	0.91	16	32	40	12	0	Neutral
PEOU3	1.56	0.58	48	48	4	0	0	Agree
PEOU4	1.66	0.59	40	54	6	0	0	Agree
PEOU5	2.72	0.88	8	32	40	20	0	Neutral
PEOU6	2.62	0.92	10	38	32	20	0	Neutral
PEOU7	1.82	0.60	28	62	10	0	0	Agree

Table 6. Attitudes Toward Using and Behavioural Intention to Use Moodle

Item	Mean	Standard Deviation	Response %					Scale
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
ATU1	1.48	0.58	56	40	4	0	0	Strongly Agree
ATU2	1.46	0.58	58	38	4	0	0	Strongly Agree
BI1	1.36	0.56	68	28	4	0	0	Strongly Agree
BI2	1.34	0.56	70	26	4	0	0	Strongly Agree
BI3	1.42	0.57	62	34	4	0	0	Strongly Agree
BI4	1.34	0.56	70	26	4	0	0	Strongly Agree

explained in detailed, but rather the participants were just asked to get a ‘feel’ of the platform. This might be solved by proper training on Moodle. Despite the

lack of deeper explanation of functionalities, participants acknowledged that their interaction with Moodle was clear, as shown by 96 % and 94 % of



them both agreeing and strongly agreeing with PEOU3 and PEOU4 respectively and none disagreeing with both statements. This might be explained by the simple interface of Moodle and easy navigation tools. Majority of participants thus agree that they will find Moodle easy to use, as shown by 90 % of them both agreeing and strongly agreeing (with mean of 1.82) with the statement PEOU7. Overall, the results in Table 5 show that after their interaction with Moodle, BUAN lecturers believe that it will not require a lot of effort in them operating Moodle, hence consider it easy to use. The statements in Table 4 are described as follows:

PEOU1: Learning to operate Moodle will be easy for me

PEOU2: I will find it easy to get Moodle to do what I want it to do

PEOU3: My interaction with Moodle was clear

PEOU4: I find Moodle flexible to interact with

PEOU5: It will be easier for me to become skilful at using Moodle

PEOU6: Moodle provides guidance in performing tasks

PEOU7: Overall, I will find Moodle easy to use.

#### 4.7. Attitude Toward Using Moodle

The availability of resources, and training on these resources is not enough for a person to use the resources, hence in order for BUAN lecturers to use Moodle, their attitudes towards using the platform will have to be taken into consideration. To determine the participants' attitudes towards using Moodle, they were asked to rate their level of agreement with the following two statements:

ATU1: My attitude towards using Moodle make me intend to use it

ATU2: My attitude towards using Moodle makes me accept to use it

A 5 item Likert scale (i.e. 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly Disagree) to rate their level of agreement on the above 2 statements was used. The statistical analysis results of this are shown in Table 6 below. According to the data, participants strongly agree with the 2 statements as shown by means of 0.58 for both. None of the participants disagreed that their attitudes towards Moodle will make them intend and accept the use the platform in teaching. Therefore, the results indicate that BUAN lecturer' attitudes point to them viewing Moodle as an attractive tool that they will be willing to use in their teaching.

#### 4.8. Behavioural Intention to Use Moodle

After interacting with and getting an appreciation of Moodle from the pilot test set in the university, the lecturers knew whether they planned to use Moodle once it is properly set up and they have gone through the needed training. To see if indeed they had formed such plans, participants were subjected to 4 statements in which they checked their level of agreement with 4 items on their intention to use Moodle. These items were again tested using a 5 item Likert scale where 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly Disagree. The participants were asked to rate their level of agreement with the 4 statements. The results, in Table 6 above, show that 70 % of lecturers strongly agree that they have intention of using Moodle, hence they will accept it if it is implemented at BUAN. TAM says if people perceive a technology useful, they will in turn form plans to use it. The results in Table 6 confirms this as 96 % of participants both agree and strongly agree that their decision to intend to use Moodle is informed by their perception of the usefulness of Moodle. TAM also shows that attitude to use technology is a direct determinant of behavioural intention to use the same technology, and this study confirmed this as 96 % of participants said their plan to intend to use Moodle is as a result of their attitude towards it. Although under TAM, perceived ease of use of technology has not been directly linked to behavioural intention to use it, this study showed that participants believe their perception on the effortless of using Moodle is a direct determinant of their intention to use the Moodle. Therefore, since BUAN lecturers perceive Moodle to be useful and not requiring much effort to use, and also having shown positive attitudes towards using it, they have plans to use it in execution of their duties once it is implemented at their university.

### 5. Conclusions, Limitations and Recommendations

This study largely confirms the findings of previous studies on the application of TAM in gauging the possible acceptance of technology. Established by this study, and other literature, PU and PEOU have positive effect on attitude of people towards using a technology. The results also indicate that PEOU is a direct determinant of PU. From BUAN lecturers' point of view, they find Moodle useful hence have formed plans to use it. Thus, this is consistent with TAM in that PU is found to have a positive influence on behavioural intention to use a technology. The lecturers' attitudes towards using Moodle have also been found to inform their intentions to use it. This is also in agreement with

TAM, and match results from other literature, that attitude towards using a technology positively influence behavioural intention to use that particular technology. Although TAM does not indicate PEOU as a direct determinant of BI, our study has shown that PEOU is a critical driver of BI. If the lecturers find Moodle to be effortless to use, and that it brings along a lot of benefits, then they will form positive behaviours of integrating it into basic teaching at BUAN.

Several studies, such as [13], have shown that demographic characteristics can influence a person's acceptance of a new technology, and this study can be extended to investigate if lecturers' demographic factors do indeed influence their acceptance of Moodle platform. These may include variables such as age, gender, educational qualifications, experience of teaching in a tertiary level institution, teaching styles and cultural background, as these factors can explain why people behave the way they do. As is the case with all empirical research, this study has some limitations that should be considered when interpreting the results. The survey participants were lecturers from only one faculty of the university, that is, the Faculty of Agriculture. Most of the lecturers are trained in agriculture, and do not have much knowledge of technological developments. Hence, this will not reveal any differences between those with and those without prior training in technology. Other university faculties are not used as they are not yet developed and functional. BUAN is a public university, and the fact that this study does not survey lecturers from private universities might not be fully representative of higher education institutions in Botswana. Nevertheless, the results of this study should be a very good starting point for research on acceptance of technology by lecturers in higher institutions of learning in Botswana.

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