Factors Influencing Instructors' Attitudes toward Technology Integration

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Abstract: *This study investigated factors that influence instructors'attitudes toward technology integration.The study was situated within the Technology Acceptance Model and conducted among university instructors (N = 63). A questionnaire was used to collect data from the participants.The results indicated that perceived usefulness and perceived ease of use positively influenced instructors' attitude s toward technology adoption. Self-efficacy was considered an external variable to evaluate its influenceon perceived usefulness, perceived ease, and attitudes. The findings showed that contrary to what similar empirical studies reported, in this study, self-efficacy had no influence on the aforementioned variables.The study attributes this lack of influence to the legitimacy of self-belief reports in providing credible information that can assist in determining people's actual experience with technology. The study concludes that self-efficacy cannot be used as a reliable tool predicting people's attitudes toward technology integration. Further, the study suggests that context in which self-efficacy is being measured may have an influence on what people believe is expected from them, as opposed to their actual experiences. A recommendationfor further investigation into other factors that may influence people's attitude such as cultural background and teaching philosophy is offered.*

Keywords: Technology adoption, attitudes, self-efficacy, technology acceptance model, perceived usefulness

1. Introduction

The decision by instructors to reject or adopt technology in their teaching is a complex issue that remains a challenge for many institutions of higher learning. Studies reveal that despite a high infiltration of various technologies in educational settings, effective utilization of these resources in learning is still an uphill battle for many universities and colleges around the world (Ertmerr&Ottenbreit-Leftwich, 2010; Kotrlik&Redmann, 2009; Moser, 2007; Oye, Salleh, &Iahad, 2011).At the University of Botswana (UB), integrationof technology in teaching is a problem that continues to trouble the university management. In 2001, the institution made a decision to make

technology part of its teaching and learning processes.Over the years, several studies have been conductedto investigate technology usage and identify issues that affect integrationof technology use at the institution (Masalela, 2009; Molelu& Thomas, 2008; Mutula, 2004;Thurab-Nkhosi, Lee,&Gachago, 2005). These studies identified issues such as inadequate resources, large classes, technophobia, workloads, lack of time, lack of training, and lack of policy on eLearningas the main stumbling blocks to technology integration.The university has made efforts to address these issues, most significantly through intensifying technology training and support and increasing the availability of technology resources for both students and instructors. However, despite these efforts, reports continue to reveal unsatisfactory usage of technology by instructors in the delivery of their courses (Mafote&Oluka, 2012). Mafote and Oluka(2012) reported that only 38% of instructors at UB have adopted technology and use it in their teaching. This has prompted the need to investigate this issue deeper and look beyond physical factorsto identify other aspects that may be affecting technology adoptionat the institution. Therefore, this study decided to look at the affective ramifications of technology integration, specifically attitudes.

Ajzen (1988) defines attitude as a complex conundrum of feelings, desires, and fears that create a state of readiness to act within a person. This study contends thatthe decision to use technology is not only determined by the availability of resources and training, but also influenced by an individual's philosophical and inner feelings about such a phenomenon. Therefore, attitudes play a significant role in this process. Staub (2009) says "technology adoption is a complex, inherently social, developmental process; individuals construct unique yet malleable perceptions of technology

that influence their adoption decisions. Thus, successfully facilitating technology adoption must address cognitive, emotional, and contextual concerns" (p. 625). This study intends to provide some empirical data on the effects of some factors that influence one's attitude towards technology. Oigara and Wallace (2012), Hardin (2006), and Tabata and Johnsrud (2008)contend that the ability to use technology in teaching starts with instructors' attitudes toward technology. Thus, the goals of this study are (1) to investigate factors that influence instructors' attitudes toward technology, and (2) establish how these factors can be influenced to promote positive attitudes towards technology. The study is situated within the Technology Acceptance Model.

1.1. Technology Integration

Technology integration in this context refers to the use of technology resources such as computers, data projectors, video conferencing, VCRs and television sets, the Internet, Learning Management Systems, PowerPoint, Social Media, etc. in instructional activities, and in the management of a course as a whole.According to Staub (2009),adoption is not only the choice to accept an innovation, but also the extent to which that innovation is appropriately integrated within a specific environment. Instructors have to develop a culture that embraces technology and regard it as part of their business everyday work. Edutopia Staff (2012) also adds that technology adoption is achieved when the use of technology is a daily occurrence; instructors do not stop to think that they are using technology tools.

1.2. Theoretical Framework of the study

This study is situated within the Technology Acceptance Model (TAM). TAM has become a robust and powerful model for

predicting user acceptance and also a key factor in helping to explain and predict user behavior of technology systems (Hsia & Tseng, 2008; Jong &Wang, 2009; Teo, Luan, &Sing, 2008). According to Park(2009), one's actual use of a technology system is influenced directly or indirectly by the user's behavioral intentions, attitudes, perceived usefulness of the system, and perceived ease of the system. Attitudes usually show themselves through one's behavior and can influence an individual's choice of action and responses to challenges (Sam, Othman,&Nordin, 2005). According to this model, attitude is a critical driver of technology adoption. In addition, external variables affect intention and actual use through mediated effects on perceived usefulness and perceived ease of use (Park, 2009). The model is illustrated diagrammatically in Figure 1 below.

might influence adoption depending on the research context. As Park, Lee, and Cheong (2007)say isnecessary to explore other constructs that would enrich the explanation of users' acceptance of technology systems. This study employed another variable that was believed to play an important role in instructors' decision to adopt technology beyond what the TAM suggests, this being self-efficacy.

1.3. Self-efficacy

Self-efficacy is the measure of one's own ability to complete tasks and reach goals(Ormrod, 2006). According to this concept, when people believe that they have the capability to successfully implement the behavioural action, they are more likely to engage in the behaviour;meaning that
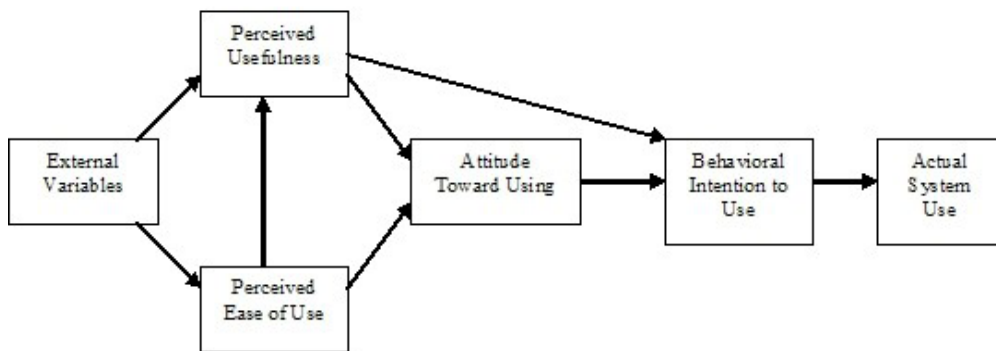

Figure 1. Technology Acceptance Model (Davis, 1989).

TAM provides guidance on how to influence usage through design and implementation (Venkatesh, Morris, Davis,& Davis, 2003; Wixom & Todd, 2005). For instance, the model provides feedback on usefulness and ease of use, but leaves room for researchers to explore other variables that

they have high self-efficacy.In terms of technology integration, self-efficacy plays a crucial role in professionally guided and self-guided behavioral change strategies. Jaradat and Faqih (2014) say that self-efficacy is an important factor to consider when determining whether people will adopt

new technologies. According to them, even if people are convinced about the benefits that a new technology may offer, if they are not confident in their own ability to use them they may not use technology. Self-efficacy is regarded as an important precursor to people' attitudes. A study by Bates and Khasawneh (2007) indicated that when students have successful and positive experiences with similar technologies, their self-efficacy for using those types of technologies increases. Several research studies have been conducted specifically on technology self-efficacy (Anderson, Groulx, & Maninger, 2011; Decker, n.d; Khasawneh, 2007;Othman, &Nordin, 2005;Seferoğlu, 2007; Teo, 2009). According to Seferoğlu (2007), technology self-efficacy of academic staff has an influence on the learning experiences created for learners and on the learners' perceptions of their own technology self-efficacy. That is, lack of confidence by instructors to use technology in their instructional activities can contribute to the learners' inabilities to use technology. He argues that because the academic staff role is to guide learners, they should feel secure in themselves when using technology. Technology self-efficacy has an effect on technology-related behaviors such as the willingness to acquire technology skills, integrate technology, and hold positive attitudes towards technology (Sam, Othman,&Nordin, 2005; Teo, 2009). Conversely, a high level of technology anxiety is negatively related to acquiring technology skills or resistance to the use of technology (Sam, Othman,&Nordin, 2005;Simsek, 2011; Shu, Tu, & Wang, 2011).This study investigated the role that self-efficacy played in shaping instructors' attitudes toward technology through measuring its impact on perceived usefulness and perceived ease of use.

1.4. The conceptual research framework

Figure 2 below is the conceptual research framework used for the study that incorporates the elements of the TAM and additional constructs.

Self-efficacy is expected to influence the Perceived Ease of Use and Perceived Usefulness of the technology, which in turn is expected to influence the instructor's attitudes toward technology. A positive attitude should subsequently lead to the integration of technology by the instructors in their teaching.
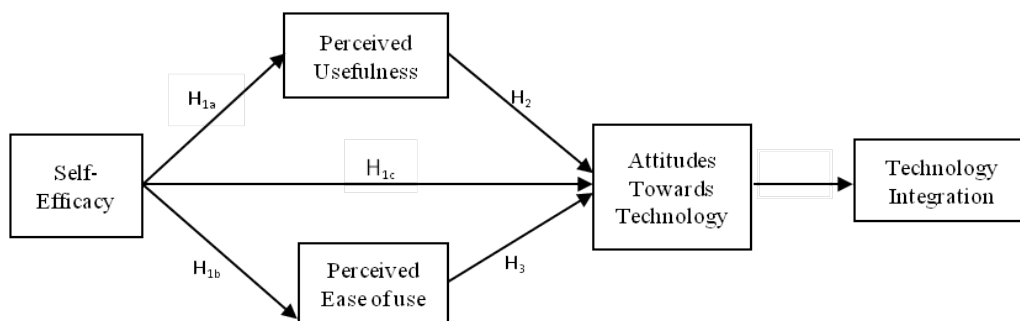

Figure 2. The conceptual research framework.

1.5. Research Hypotheses Statements

The following hypotheses statements were set for the study:

- H_{1a}: Self-efficacy will have significant influence on perceived usefulness.

- H_{1b}: Self-efficacy will have significant influence on perceived ease of use.

- H_{1c}: Self-efficacy will have significant influence on attitudes.

- H_2: Perceived usefulness will have significant effect on attitudes.

- H_3: Perceived ease of use will have significant influence on attitudes.

2. Methodology

2.1. Sampling

The sample population was drawn from UB instructors belonging to various departments. Simple random sampling was used to select the participants such that each member of the population had an equal opportunity to become part of the sample. The participants were drawn at random from all faculties at UB, namely, Faculty of Business (FoB), Faculty of Education (FoE), Faculty of Engineering and Technology (FET), Faculty of Health Sciences, Faculty of Social Sciences (FSS), Faculty of Science (FoS), and the School of Medicine. However, the numbers from each faculty varied depending upon the willingness of participants to take part in the study. The sample size was calculated using an online sample calculator from http://www.macorr.com/sample-size-calculator.htm. The calculator required the (a) total number of instructors at UB (which is 850),(b) the confidence level, which was estimated to 90%, and (c) confidence interval, set at 10% for its calculation of an appropriate sample size. The calculation gave a sample size of 63.

2.2. Data Collection Instrument

This research study used a questionnaire to collect data. A survey questionnaire was used to collect data from the sample population. Reliability was established by using a pilot test, and collecting data from 20 subjects not included in the sample for validity purposes. The purpose of the pilot test was to check whether there were items that too difficult, confusing, or weak, and those items that did not correlate well with the total scale score (Slavin, 2007).

2.3. Measurement of Constructs

2.3.1. Measurement of Attitudes toward Technology (ATT)

ATT is a two-dimensional construct which included items that assessed Perceived Usefulness (PU) of technology and Perceived Ease of Use (PEU) of technology. The 'Perceived Usefulness' sub-scale measured whether the instructor found technology to be generally helpful, interesting, and enhancing their instructional activities. On the other hand, 'Perceived Ease of Use' sub-scale measured the perceived comfort level or difficulty of using technology and gave an indication on the level of confidence in handling and using the technology. A Technology Attitude Scale (TAS) was used to assess this construct. The scale had 8 survey items (see Appendix A). Each item was measured on a five-point Likert scale of strongly disagree (1), disagree (2), neither (3), agree (4), and strongly agree (5).

2.3.2. Measurement of Technology Self-efficacy (TSE)

A TSE Scale was used to determine instructors' self-efficacy in using technology. The scale had nine survey items (see Appendix B). Literature shows similar studies have been conducted before (Teo&Koh, 2010; Wang, Ertmer& Newby, 2004), and therefore, instead of re-inventing the wheel the researchers used existing instruments to suit the UB situation with some adaptations. Each item was measured on a five-point Likert scale of Not Confident At All (1), Not Confident (2), Neutral (3), Confident (4), and Very Confident (5).

2.3.3. Measurement of Technology Integration (TI)

The study used a Technology Integration Scale (TIS) to assess the use of technology resources by instructors. The scale had nine survey items (see Appendix 3). Each item was measured on five-point Likert scale of strongly Never (1), Rarely (2), Sometimes (3), Often (4), and Very Often (5).

From these measurements the following null hypotheses were tested:

- H_{01a}: Self-efficacy will have no significant influence on perceived usefulness.

- H_{01b}: Self-efficacy will have no significant influence on perceived ease of use.

- H_{01c}: Self-efficacy will have no significant influence on attitudes.

- H_{02}: Perceived usefulness will have no significant effect on attitudes.

- H_{03}: Perceived ease of use will have nosignificant influence on attitudes.

2.4. Data analysis procedures

After the data was collected, the data was entered to an Excel spreadsheet and organized before being imported to the Statistical Package for Research Software Program (SPSS). The analysis of data involved determining descriptive statistics, frequencies, correlation of variables, and conducting independent t-tests. The spread of the variables was calculated using the range and the standard deviation. From the standard deviation a standard error of the mean was calculated. Descriptive statistics can only show patterns or summarize data sets through the analysis of numeric data. Thus, inferential statistics was used to deduce from the sample data what the population might have thought and to make judgments of the probability that an observed difference between groups was a dependable one or one that might have happened by chance in the study (Trochim, 2006).

3. Results

3.1. Descriptive statistics

The findings of this study indicated that the technology integrationlevel among participants was about 70% with majority of participants indicating that they often used various technological resources in the delivery of their courses.Attitudes toward technology were regarded as the lecturers' general perceptions toward the use of technology in learning. This was a two-dimensional construct that measured items that assessed Perceived Usefulness of technology and Perceived Ease of Use of technology. The results indicated that about 75% of the participants found technology to be useful in their teaching, whereas, 48% indicated they found technology easy to use.Self-efficacy of participants in using technology was measured to be 90%, with participants indicating high confidence level in using various technology resources in their teaching.

Table 1. Biographical information of the participants

Strata	Frequency	Percentage
Male	27	50
Female	27	50
Trained in technology	25	47.2
Not trained in technology	28	52.8
Age groups		
Young instructors (≤50 years)	34	63
Older instructors (≥50 years)	20	37

3.2. Results of the hypotheses testing

3.2.1. H_{01a}: Self-efficacy will have no significant influence on perceived usefulness.

Bivariate correlations were run to relate self-efficacy (Dependent Variable) to Perceived Usefulness (Independent Variable). The results showed no statistically significant relationship between Self-efficacy(M = 27.50, SD = 15.73) and Perceived Usefulness (M = 27.50, SD = 15.73),and the p-value was .23 (□0.05).The null hypothesis was retained, and can be concluded that the relationship between the two variables were likely due to chance.

3.2.2. H_{01b}: Self-efficacy will have no significant influence on perceived ease of use

A bivariate correlation was run to relate Self-efficacy (DV) to Perceived Ease of Use (IV).The results indicated no statistically significant relationship between Self-efficacy (M = 27.50, SD = 15.73) and Perceived Ease of Use (M = 27.50, SD = 15.73),and the p-value was .31 (□0.05).The hypothesis

was retained, and can be concluded that the relationship between the two variables was due to chance.

3.2.3. H_{01c}: Self-efficacy will have no significant influence on attitudes

A bivariate correlation was run to relate Attitude Towards Technology (DV) to Self-efficacy (IV).The results indicated a statistically significant relationship between Attitude Towards Technology(M = 27.50, SD = 15.73) and Self efficacy ICT skills (M = 27.50, SD = 15.73),and a p-value was found to be less than .05.The hypothesis was retained, and can be concluded that the relationship between the two variables was due to chance.

3.2.4. H_{02}: Perceived usefulness will have no significant effect on attitudes

The results indicated a statistically significant relationship between Attitude Towards Technology (M = 27.50, SD = 15.73) and Perceived Usefulness (M = 27.50, SD = 15.73),and a p-value was found to be less than

.05.The null hypothesis was rejected, and can be concluded that the relationship between the two variables was due to manipulation of the independent variable. The results suggested that Perceived Usefulness had a positive effect on attitudes.

3.2.5. H_{03}: Perceived ease of use will have nosignificant influence on attitudes

A bivariate correlation was run to relate Attitude Towards Technology (DV) to Perceived Ease of Use (IV).The results indicated a statistically significant relationship between Attitude Towards Technology (M = 27.50, SD = 15.73) and Perceived Ease of Use (M = 27.50, SD = 15.73),and a p-value was found to be less than .05.The hypothesis was rejected, and can be concluded that the relationship between the two variables was due to manipulation of the independent variable. The results suggested that Perceived Ease of Use had positive effect on attitudes.

3.3. Discussion

This study sought to determine factors that influence instructors' attitudes toward the integration of technology through the guidance of Technology Acceptance Model. According to this model and other previous studies, attitudes play a significant role in the adoption of technology in learning (Abukhzam& Lee, 2010; Kim, Chun,& Song, 2009). This study investigated factors that influenced this attitude as an effort to assist in cultivating positive attitudes among instructors that can promote technology integration in teaching and learning.

According to the TAM, attitudes towards technology are influenced by perceived usefulness and perceived ease of use. The results of this study confirmed this proposition as it showed that both perceived usefulness and perceived ease of use had

positive significant influences on attitudes. Because these two variables have had such a significant impact on attitudes, it was very important to investigate the factors themselves to determine how they could be positively influenced with the ultimate goal of promoting technology integration. In this study, self-efficacy was brought in as an external variable that hypothesized to have had a significant influence on people's perception on the usefulness of technology and on its perceived ease of use. However, the results of this study indicated that self-efficacy had no influence on perceived usefulness and perceived ease, and also directly on the attitudes themselves.

The lack of influence of self-efficacy on perceived ease of use as shown in this study is intriguing because logically one can assume that if a person believes in his/her capability to perform an activity, then that should improve the person's perception toward its ease of use as shown by similar empirical studies (Lee &Medlinger, 2011;Uwaifo, 2010). The fact that participants in this study reported high self-efficacy levels, which in turn did not impact their perception on the ease of use of technologies,indicated the complexities of human behavior towards accepting new phenomenon.

Self-efficacy is based on how people judge their abilities and according to Bandura (1994), this judgment is influenced by four main factors. These include mastery of experiences, social modeling, social persuasion, and psychological responses. The four factors impact self-efficacy in different ways depending on the nature of the task at hand. In a situation such as this present study, social modeling and social persuasion play a significant role in influencing people's self-efficacy. This study reports that considerable efforts have been made to train instructors to use technology and persuade them in different ways to use technology in their teaching, most

notably through presentations made by other users who have had positive experiences with the use of technology. Therefore, people could eventually believe that they are now capable of carrying out the said activity, whereas in reality, they find it difficult. This shows taking consideration of the context in which self-efficacy is being reported and noting the possible factors that may play a significant role in influencing people's judgment of their capabilities are important.

In a similar manner, this study showed that self-efficacy did not influence perceived usefulness, which meant just because the participants believed that they had confidence in using technology,this did not necessarily mean that they found technology useful. A possible explanation to this lack of relationship between self-efficacy and perceived usefulness may be through Bandura's social modeling concept that posits people's ideas of usefulness can be influenced by observing how useful something is to other people, which eventually make them believe it is useful to them too. However, whether they actually find technology useful to their practices is what matters because that translates into positive attitudes.This lack of influence by self-efficacy on perceived usefulness goes some way in explaining why even after training and availing instructors the best of technologies they still do not use them; possibly because they may not have yet established this usefulness for their own benefit.This study also indicated that self-efficacy did not directly influence attitudes. Participants' self-belief in their capabilities to use technology did not impact their attitudes towards integration.

3.4. Conclusion and recommendations

The findings of this study clearly rules out self-efficacy as a determining factor in influencing people's attitudes toward technology. This is a departure from a majority of research findings that have often reported a significant influence of self-efficacy on perceived usefulness, perceived ease of use, and attitudes. These studies have subsequently recommended promotion of self-efficacy to positively influence people's attitudes toward new innovations. This study,on the other hand, questions self-efficacy as a credible departure point in predicting people's attitudes toward technology adoption. This paper argues to carefully analyze the context in which self-efficacy reports are made because self-reports may be more of what the participants believe is expected of them as opposed to what is real.

Established by this study and other literature, perceived usefulness and ease of use are important antecedents to positive attitudes. This study recommends further investigation into other factors that may positively influence these two variables beyond self-efficacy. These can include variables such as cultural background and teaching philosophy both of which can help explain why people behave the way they do.

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Appendix: Survey Questionnaire

Section 1: Attitudes towards Technology

Indicate with an X your response to the statements made below

[Scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither; 4 = Agree; 5 = Strongly Agree]

Statement	1	2	3	4	5	NA
Technology help me to do my work better						
Technology make it possible to work more productively						
Technology can allow me to do more interesting and imaginative work						
Technology can be used to do most things that I cannot do myself						
Technology can enhance the presentation of my work to a degree which justifies the extra effort						
My interaction with technology is clear and understandable.						
I find it easy to get technology to do what I want it to do						
I find technology (e.g., computers, data projector, Learning Management systems, etc.) easy to use						

Section 2: Technology Self-Efficacy

Indicate with an X your response to the statements made below

[Scale: 1 = Not Confident At All; 2 = Not Confident; 3 = Neutral; 4 = Confident; 5 = Very Confident]

Basic Technology Skills	1	2	3	4	5
How confident are you to …					
use word processor to create, edit and format documents for specific purposes. (e.g., Microsoft Word)					
use presentation Software (e.g., Microsoft PowerPoint) for classroom delivery					
use data projector with a PC or laptop to do presentations					
use spreadsheet to record data, compute simple calculations and represent data in the form of tables and graphs (e.g., Microsoft Excel)					
Social Media Skills					
use email (e.g., Hotmail, Outlook, Yahoo, Gmail, etc.) for communication					
use social networks (e.g.,facebook, twitter, etc.) to communicate or collaborate with my colleagues					
Web-Based Skills					
use Internet to search for information and resources					
copy a block of text from a web site and paste it to a document in a word processor					
download an image from a web site and save it to my desktop					

Section 3: Technology Self-Efficacy

Indicate with an X your response to the statements made below.

[Scale: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Very Often]

	1	2	3	4	5
I use ….					
technology in my course to enhance student learning					
instructional technology in my course to improve my teaching.					
Internet for ideas when developing course material and work					
Learning Management System (i.e., Moodle, Blackboard/ WebCT)					
email in Moodle/Blackboard to keep students up-to-date on grades and student progress					
Excel spread sheet or Online grade book to analyse students' work					
simulations and games (i.e., reproducing the characteristics of a system or process)					
data projector in my lectures					
communication tools (in Moodle/Blackboard) and or other Social networks (e.g., facebook, twitter) to encourage communicate or collaborate with my students					