Postgraduate students' use of mobile phones as a supporting tool for learning at Sokoine University of Agriculture, Tanzania

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ABSTRACT

This study aimed to investigate the use of mobile phones as a learning tool among postgraduate students at Sokoine University of Agriculture. The study adopted a cross-sectional research design. The sample size was 120 respondents selected through the stratified sampling technique and data were collected using structured questionnaires. Descriptive statistics such as frequency and percentages were used for data analysis, while linear regression was used to analyse factors influencing students' use of mobile phones as a learning tool. The findings show that most students used mobile phones for sharing lecture notes and reading lecture notes as well as downloading academic materials. Furthermore, the study findings reveal that factors influencing students' use of the mobile phone as a learning tool were perceived usefulness, perceived ease of use, and attitude. The study concludes that use of mobile phones as a learning tool is high among the postgraduate students. Moreover, the study recommends that seminars should be provided to students on the effective utilization of their mobile phones for academic purposes to enhance learning.

Keywords: *Postgraduate, Perceived usefulness, perceived ease of use, Attitude. Sokoine University*

INTRODUCTION

Information is very important in every sector, especially in academia where students are those who are in high demand of academic information for their intellectual development. Students in higher learning need to be deeply taught on different subject matters during their studying period. Major sources of information resources used by students includes books, academic journal articles and published expert reports, which can be accessed in printed form or in electronic forms (Tenopir et al., 2015). However, students experience various challenges in the process of accessing information from print resources, among which is the time to access the needed information. As noted by Mahwasane & Mudzielwana (2016), it takes students a lot of time to search for needed printed materials in the library. Moreover, the process for gaining access to printed sources of information is not flexible, as students need to be in the physical library to access needed materials or publications. To avert this situation, Information and Communication Technology (ICTs), particularly Internet-enabled mobile phones or smartphones have been deployed as supporting learning tools by most students across schools. Mobile phones can be used as a learning tool by students through which they could access various education materials from different databases (Kim & Park, 2019). To accomplish various tasks and assignments, students utilize both printed and electronic resources to solve problems associated with accessibility of information resources.

Mobile phones are the most common personal communication technology used worldwide by different people (Atas & Celik, 2019). The use of mobile phones is most common among university students parallel with Internet use which enable students' wide access to various information sources, thus the mobile phone is widely used by students for Internet access (Sun & Gao, 2020). It creates an opportunity for them to use mobile phones as a learning tool.

Mobile phone devices have great potential for accessing information (Kates et al., 2018) given their computing ability that makes it possible for the device to perform different tasks as a computer does. Use of advanced mobile phones like smartphones and the iPad enables students to easily access information resources through browsing the Internet and downloading different materials relating to academic activities. Also, due to the advanced features of a mobile phone, it enables easy sharing of different information like lecture notes, assignments and continuous assessment tests, and announcements, among fellow students or between teachers and the students, especially using mobile apps like WhatsApp and Bluetooth (Mtega et al., 2012).

In addition, mobile phones enhance access to various social media such as YouTube, which enable students to watch videos relating to various subjects (Latif et al., 2019). It enables students to communicate and collaborate with fellow students on various academic issues and communicate with instructors and supervisors teaching various courses (Burns & Lohenry, 2010). The device enables students to use various platforms such as Google to accomplish their task in a more convenient way, within a short time, and hence saves time and resources because they can work remotely (Foti & Mendez, 2014; Islam, 2019; Hidayat, 2020).

STATEMENT OF THE PROBLEM

Mobile phones are becoming popular among the population, including university students. Use of mobile phones as a learning tool has gradually become a trend as usage in education brings new opportunities and can improve the learning process. As shown in earlier studies, the use of mobile phones among students in higher learning can influence high academic performance (Sumath et al., 2006). However, despite high ownership of mobile phone, studies have shown that students have low use of mobile phones for learning purpose in Tanzanian higher learning institutions. (Kibona & Mgaya 2015; Twum 2017).

The achievement of using mobile phones as a leaning tool among the students in university requires students' awareness on usefulness and positive attitudes towards using mobile phones. Previous studies in Tanzania regarding the use of mobile phones among students in higher learning have largely examined the effects on academic performance among undergraduate students (Kibona & Mgaya, 2015) while Mtega et al., (2012) assessed the use of mobile phone for teaching and learning purpose among undergraduate students. Mwalukasa (2022) assessed the factors influencing mobile phone usage for accessing academic information among the undergraduate students.
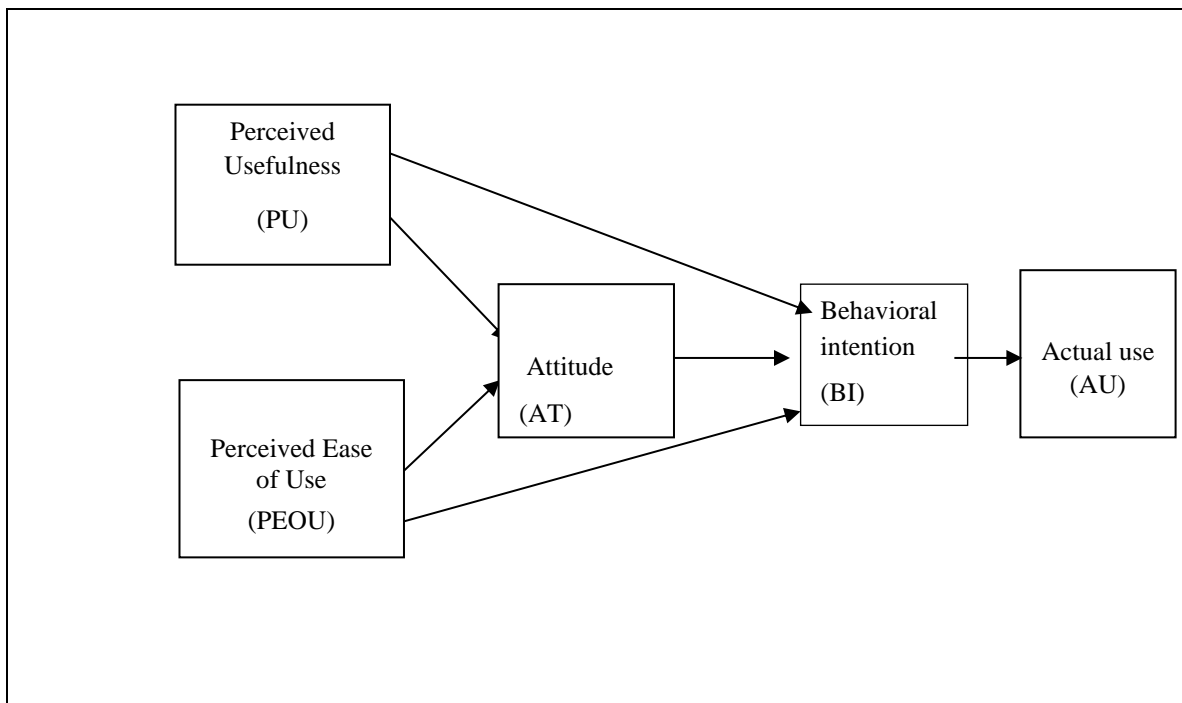
Since students' attitudes, perceived usefulness, and perceived ease of use are decisive in successful use of mobile phones as a learning tool, this study attempts to determine whether postgraduate students have favourable attitudes to, and perceived usefulness of using mobile phone as a learning tool. Unlike much of the previous research on usage of mobile phones in Tanzania which assessed usage by undergraduate students, the present study investigated the use of mobile phones among postgraduate students. The study also attempts to examine the influence of socio-demographic characteristics of the students on the usage of mobile phones as a learning tool.

Objectives of the study

i. To examine usage of mobile phone among postgraduate students as a learning tool
ii. To assess the factors influencing the use of mobile phones as a learning tool among postgraduate students.

THEORETICAL REVIEW

The Technology Acceptance Model (TAM) proposes that factors that influence use of technology are perceived usefulness, perceived ease of use, attitude and behavior intention. Perceived usefulness refers to the extent to which an individual considers that the use of the technology will improve the work, whereas perceived ease of use is the degree to which an individual considers the technology not being laborious (Roy et al., 2018). An individual's attitude on the technology is determined by positive or negative view of the individual toward the technology (Venkatesh & Davis, 2000). Individual attitude influences adoption of the technology, and is influenced by two main factors, namely perceived ease of use and perceived usefulness. Perceived usefulness is directly influenced by perceived ease of use (Venkatesh et al., 2003) as shown in the figure below

Figure 1: TAM as proposed by Venkatesh & Davis (1996)

This study assumes that perceived usefulness, perceived ease of use and attitude influence students' use of mobile phones as a learning tool. Therefore, the research will use the following hypotheses:

 H1: There is no significant statistical influence of postgraduate students' perceived usefulness of mobile phone and use of mobile phones as a learning tool.

 H2: There is no significant statistical influence of postgraduate students' perceived ease of use of mobile phone and use of mobile phones as a learning tool.

H3: There is no significant statistical influence of postgraduate students' attitude towards use of mobile phone and use of mobile phones as a learning tool.

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RESEARCH METHODOLOGY

This study was conducted in the Morogoro region at Sokoine University of Agriculture (SUA). The reason of selecting this study area is that it is among the old public institutions with large numbers of postgraduate students. The population for this study was all the postgraduate students registered at Sokoine University of Agriculture**.** The total number of the postgraduate students in the selected program was 167, but to ensure that a representative number of students at all the colleges were included, Yamanes's formula for sample size determination for finite population at 5% level of precision was used, yielding a sample size of 117. The stratified random sampling method was used to select 30 students from each College, namely the college of Agriculture (CoA), College of Forestry, Wildlife and Tourism (CFWT), College of Social Science and Humanities (CSSH) and College of Veterinary Medicine and Biomedical Sciences (CVMB). The primary data for this study were collected by using questionnaires which contained both open and closed ended questions.

The students' usage of mobile phone as a supporting tool for learning was assessed using a list of various ways of using mobile phone for academic purposes Respondents were asked to rate their level of usage as: "very frequent," "frequent," "rare", "very rare", or "never,", which were later scored as 4, 3, 2, 1, and 0, respectively. Each student's usage score was obtained by summing up their response scores to each of the items on mobile usage as a learning tool (Benard et al., 2021).

Further, attitude, perceived usefulness and perceived ease of use of the mobile phone as a learning tool used a five point Likert Scale for student responses with response options assigned as follows: 5-Strongly agree, 4-Agree, 3-Neutral, 2-Disagree and 1-strongly disagree. Then numerical values for the response options were reversed when calculating the overall score for negative statements, thus it was recorded as 1-Strongly agree, 2-Agree, 3-Neutral, 4-Disagree and 5-strongly disagree for negative statements. An overall score for perceived usefulness, ease of use and attitude was calculated by summing up the response scores of the respondent to get the index score (Mwalukasa, 2022). The higher values indicated that respondents perceive mobile phones to be useful, easy to use, but also have a positive attitude toward using mobile phones as a learning tool.

The collected quantitative data were coded, and the Statistical Package for Social Sciences (SPSS) was used for data analysis. Descriptive statistics such as frequencies and percentages and linear regression was used to analyse the factors influencing the use of mobile phones.

Linear regression

The multiple regression equation used for analysis was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_6 X_6$$

Where;

Y= Usage of mobile phone as a learning tool total score

β= Regression Coefficients.

β_0= Intercept.

$X_1 \ldots X_6$ are independent factors (Sex (0=Female, 1=Male), Age(1=20-30, 2=31 – 40, 3=More than 41), Program (0=Masters, 1=PhD), Perceived usefulness (Perceived usefulness index score), Perceived ease of use (Perceived ease of use index score) and Attitude (Attitude index score)

To ensure validity of the research instrument, items were borrowed from the validated instrument by various scholars (Benard *et al.*, 2020, Mwalukasa, 2022). In addition, to assess the reliability, the questionnaire was tested using 20 respondents for further improvements. Split half Brown Cronbach's was used to determine external reliability of the instrument while Cronbach's alpha was used to determine internal reliability (Pallant 2020). Split half Brown Cronbach's alpha was 0.833, which implied that the instrument was reliable. The Cronbach alpha for perceived usefulness, perceived ease of use and attitude, shown in Table 1 indicate the result for perceived usefulness and ease to use is higher than 0.7 indicating the scales are reliable. However, the Cronbach's alpha for attitude was less than 0.7. One item with higher Cronbach's α was removed and the remaining items resulted in Cronbach's α of 0.871 implying that the scale with the item deleted was reliable.

Table 1: Reliability test

Variable	Number of items	Cronbach's alpha	Cronbach's Alpha if Item Deleted
Perceived usefulness	4	0.923	0.865-0.944
Perceived ease of Use	4	0.821	0.801-0.892
Attitude	6	0.631	0.679-0.871

Construct validity of the study variables was evaluated using Principal Component Analysis (PCA) and varimax rotation which maximize the variance of the factor loading.

RESULTS AND DISCUSSION

Demographic characteristics of respondents

In terms of study program, among the respondents 6.7% were PhD students, 40.8% were Master of Science and 52.5% were Master of Arts students respectively. In terms of gender, the results in Table 2 show that more than half (59.2%) of the respondents were male while 40.8% were female. The study by Nunda & Elia (2019) though observed that the majority of respondents in higher learning education institution were males. In this study the proportion of male to female students suggests that both sexes are having almost equal opportunity to be educated at the higher level of education in the institutions surveyed in Tanzania.

Table 2: Demographic characteristics of respondents

Characteristics	n	%
Program		
Master of science	49	40.8
Master of Arts	63	52.5
PhD	8	6.7
Gender		
Male	71	59.2
Female	49	40.8
Age categories(Years)		
20 - 30	14	11.7
31 - 40	67	55.8
More than 41	39	32.5

As shown in Table 2, about half (55.8%) of the respondents were between 31 and 40 years old, while those between 41 and 50 years accounted for 32.5% of the respondents. The prevalence of respondents in the older groups is related to the fact that most of the students joining the university for higher degree are those who completed their undergraduate studies and those who are in service.

Usage of mobile phones as a learning tool among postgraduate students

The results shown in Table 3 illustrate the students' responses on how they used their mobile phones as a learning tool. The findings indicate that more than half (71.7%) of the respondents used mobile phones for sharing lecture notes frequently. Few of the respondents (2.5%) had never used mobile phones for sharing lecture notes. The possibility of sharing lecture notes and slides more quickly and with ease, through their mobile phones is enabled by Internet-laden features such as Bluetooth, and social media like WhatsApp, Facebook, and Instagram. During an interview, one respondent reported that *'in our class we have WhatsApp group of the class where the class representatives normally send the lectures notes for easy access by all members of the class within short of time*". This concurred with the study by Mlozi *et al.,* (2016) that most students in universities frequently used their mobile phone for sharing lecture notes.

Further, the findings show that more than half (55.8%) of students frequently read their lecture notes from mobile phones. At the university there are only a few ICTs devices, such as computers, available at the campus but most students own smartphones with large screens and higher resolution. This makes it easier for students to browse and read a large number of pages from their mobile phones. This result is in line with the observation by Ataş & Çelik (2019) that mobile phones enhance students' reading of notes and other academic materials with ease and at their convenience.

In addition, 46.7% of the students indicated that they used mobile phones to download academic materials very frequently while 40.8% did so frequently. This is because the mobile phones have Internet-enabled features to download volumes of academic materials in different formats with ease at any time. This is a practice among postgraduate students elsewhere around the world as earlier noted by Mtega et al. (2012) and Mpofu (2016). Most of the students used mobile phones to access various reading materials.

Table 3: Usage of mobile phones as a learning tool among postgraduate students

Usage	Very frequent		frequent		Rare		Very rare		Never	
	n	%	n	%	n	%	n	%	n	%
Sharing lecture notes	86	71.7	20	16.7	7	5.8	4	3.3	3	2.5
Reading lecture notes	67	55.8	33	27.5	11	9.2	3	2.5	6	5.0
Downloading academic materials	56	46.7	49	40.8	8	6.7	4	3.3	3	2.5
Communicating with supervisors	46	38.3	43	35.8	15	12.5	11	9.2	5	4.2
Watching tutorials video	26	21.7	46	38.3	28	23.3	19	15.8	2	1.7

Moreover, the findings show that 38.3% use their mobile phone for communicating with their supervisor very frequently while 35.8% of students did so frequently. More than half (60%) of the respondents indicated that they frequently used their mobile phone for watching tutorial videos

related to academic content. It was found that respondents used mobile phones to access the videos uploaded on the various websites and on social media which relate to various topics they have learned during the lecture session. Videos are an effective method to enhance students' understanding on different topics. It increases student's motivation and gives the practical experience to students (Mendoza et al., 2015).

Factors influencing the use of mobile phones as a learning tool among Postgraduate students

Looking at factor analysis, the results of the Kaiser-Meyer-Olkin (KMO) measure was 0.647 implying that the sample was adequate for factor analysis. Further, the Bartlett's test of sphericity was significant at p<0.05 which indicates that the model is appropriate for the available data. The thirteen (13) items were converted in three variables namely perceived usefulness, perceived ease of use and attitude, as the items constructed were deemed valid to measure the three scales. The results showed that all three variable factors explained 69.5% % of the total variation.

Table 4: *Pattern matric after Varimax rotation*

Statements	PC1 (36.7%)	PC2 (23.6%)	PC3 (9.2%)
Using the mobile phones enables me to share academic information more quickly.	0.901		
Using the mobile phones enhanced me effectiveness in academic practices.	0.886		
Using the mobile phones enhances the quality of my academic practices.	0.876	0.412	
I find the mobile phones useful in sharing information in my studies activities.	0.823		
Learning to use the mobile phones is easy for me		0.753	
I find it user-friendly to use the mobile phones to do what i want to do in my academic practices		0.742	
I find it easy for me to become skillful in using the mobile phone for academic purpose		0.716	
Use of mobiles phones for sharing academic information is easy for me		0.702	
Use mobile phones in sharing academic information would make my studies activities more interested	0.411		0.700
Use of mobile phones in sharing academic information is good idea			0.675
I have a generally favorable attitude toward using the mobile phones in sharing academic information			0.654
I have a generally negative attitude toward using mobile phone in receiving and sharing academic information			0.551
Mobile phone is not user friendly technology for receiving and sharing academic information	0.434		0.511

Kaiser-Meyer-Olkin (KMO)= 0.647; Bartlett's Test of Sphericity (Approx. Chi-Square=228.18, df=78, sig=0.00)

PC: Principal Component: PC1: Perceived usefulness, PC2: perceived ease of use, PC3: Attitude

The data in Table 4 indicates that the first principal component (PC1) accounted for 36.6% of the total variation in the statements relating to perceived usefulness. PC2 accounted for 23.6% of the total variation in the statements relating to perceived ease of use, while PC3 accounted for 9.2% of the total variation in the statements relating to attitude. Thereafter, 4 statements for perceived usefulness, 4 for perceived ease of use and 5 for attitude were used to construct the index score for perceived usefulness, perceived ease of use and attitude respectively.

Table 5 below shows results of the regression model for the factors influencing the use of mobile phones as a learning tool. Factors which were included in the model were perceived usefulness, perceived ease of use and attitude. However, the model also included demographic characteristics such as, age, sex and program as control variables.

Table 5: *Factors influencing of mobile phones as a learning tool*

Factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Beta	Beta			Tolerance	VIF
(Constant)	-10.567	7.984		-1.324	.192		
Perceived usefulness	5.229	.678	.734	7.714	.000	.883	1.133
Perceived ease of use	2.742	1.162	.385	2.360	.022	.701	1.426
Attitude	.710	.287	.404	2.472	.017	.562	1.778
Age	-1.036	.873	-.104	-1.187	.241	.811	1.233
Sex	-2.389	3.055	-.146	-.782	.438	.583	1.715
Program	5.898	3.077	.362	1.917	.061	.561	1.783

Multiple R=0.814; R Square= 0.663; p=0.000; Durbin-Watson= 1.650

Prior to performing multiple linear regressions, we tested the assumptions for multiple linear regressions. First, the test for multicollinearity showed that the variance inflation factor (VIF) of all the independent variables ranged between 1.133 and 1.783. Since all the VIF were less than 10, the data did not present with a multicollinearity problem (Pallant 2011, 2020). Moreover, the Durbin-Watson statistic was 1.650 and in accordance with the auto autocorrelation rule of thumb (Hair et al., 2010) the data did not present for auto correlation as the Durbin-Watson statistic was between 1.5 and 2.5.

Moreover, the Multiple R was 0.814 implying that there is a strong relationship between the independent variables and the dependent variable. The coefficient of determination was 0.663 indicating that the independent variable that has been included in the model accounts for 66.3% of mobile phone usage as a leaning tool among the postgraduate students.

The beta value for perceived usefulness was positive 5.229, and it is statistically significant (P$\leq$0.05). This implies that an increase on the perceived usefulness score of respondents on use of mobile phone as a learning tool, increases the usage of mobile phones by 5.229. This means that respondents who agreed that using mobile phones as a learning tool and that it is useful in improving their learning activities have higher usage of it. This finding is similar to earlier studies such as Tagoe & Abakah (2014) which reported that perceived usefulness influenced students' readiness to use mobile phones for learning purposes. More so, the findings are similar to the study by Matyokurehwa et al., (2020) which established that perceived usefulness significantly influenced students' intentions to use smartphones as a learning tool.

Further, perceived ease of using mobile phones influenced students' usage of mobile phones - beta coefficient of 2.742, that is statistically significant (p=0.022). This implies that a one unit increase

in the perceived ease of use score increases mobile phone usage by 2.742. Respondents who agreed that using mobile phones is easy, had higher chances of using mobile phones as a learning tool. This result aligns with Mwalukasa (2022) and Almaiah et al., (2016), who found that respondents who perceived the use of the mobile telephony technology as easy had higher chances of using the technology in accessing academic information.

In addition, the beta coefficient for student's attitude was 0.710 implying that students with positive attitudes toward use of a mobile phone will likely use the device as a learning tool. (Park et al., 2012).

A beta coefficient of -1.036 was shown for the variable age. An increase in student age by 1 year lowered the usage score of using mobile phone as a learning tool by 1.036. This implies that older students had lower chances of using mobile phones than younger students. Nevertheless, the factor is not statistically significant ($p \geq 0.05$). This indicates that age was not a determinant of using a mobile phone as a learning tool. This finding is contrary to an earlier study by Binyamin et al., (2020) which found that age influenced students' intent of using mobile phones for learning purposes.

Further, the results showed a beta coefficient of -2.389 for sex, implying that females had a lower chance of using mobile phone as a learning tool. However, the variable was not significant. In addition, the beta coefficient for the program was 5.898. This means that those in higher level programs had a high chance of using mobile phones as a learning tool, However the variable was not significant ($p \geq 0.05$). This implies that the program of the students did not influence mobile phone usage as a learning tool among the respondents.

CONCLUSION AND RECOMMENDATIONS

Mobile phones are among new ICTs devices with high penetration and usage in education institutions. In Sokoine University of Agriculture in Tanzania, it was observed that the postgraduate students used mobile phones for sharing lecture notes, reading lecture notes, downloading academic materials, communicating with supervisors and watching tutorial videos. The usage of mobile phones by the students was determined by perceived usefulness, perceived ease of use, and attitude. The results of the study lend to the recommendation that education experts should explore creative ways of using mobile phones as learning tools with a view to making it attractive for extensive use by students.

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