Change Agents, Training and Age as Correlates of Use of Computers among Masters Students in Makerere University School of Education

Bakkabulindi, F. E. K.
East African School of Higher Education Studies and Development, Makerere University

Kabasiita, J.
Mountains of the Moon University

The purpose of the study was to establish the relationship between each of (i) change agents (ii) training and (iii) age and use of computers among Masters students in School of Education, Makerere University. The study was a correlational and cross-sectional survey biased to the quantitative approach, involving 69 respondents. Primary data were collected using a self-administered questionnaire, and their validity and reliability ascertained using Factor Analysis and Cronbach Alpha respectively. Means were used for descriptive data analysis, while t test, Analysis of Variance helped with preliminary test of hypotheses at bivariate level. Correlation was used to test for absence of multicollinearity among independent variables, while Regression Analysis helped with confirmatory test of hypotheses at multivariate level. The study found that while (i) interaction with ICT change agents and (ii) ICT training were insignificant correlates of use of computers; (iii) age was a significantly negative correlate of the same. Appropriate conclusions and recommendations were made, including the recommendation that to improve use of computers among Masters students in the School of Education, Makerere University, stakeholders such as Dean, deputy deans and heads of department should give extra encouragement and/ or assistance with respect to ICT to the aged and ageing students.

Keywords: ICT, Innovation adoption, Rogers' Theory

Introduction

Organizations wishing to survive have to foster adoption of innovations among their members (Mullins, 2010). One innovation that is particularly important for organizational survival these days are computers and/ or ICT, given their innumerable benefits such as raising efficiency of those who use them, by for example making them work faster and with increased accuracy. Computers have raised productivity of their users by for example making them (users) more versatile, that is able to do more than one job, say by allowing a computer user to be an own secretary and filing clerk. Unfortunately however, use of computers and/ or ICT by students in Makerere University has consistently been reported to be very low. For example Asiimwe (2011, April 18 – 24) in the *East African* newspaper of that week, quoted the then Vice Chancellor of the University as decrying the non-use of online library services by students, thus

Professor Baryamureeba says [that] students rarely use… [online] publications and some of the publishers are raising queries about this.

He says [that] Makerere subscribes to 10,000 e-books and e-journals, which students have access to as long as they are within Makerere Campus. However, only a few students use them.

This failure by students to make optimal use of ICT in the University leads to several undesirable outcomes such as wastage of funds the University and donors have sank on underutilized or even unutilized facilities. For example the Makerere University ICT Policy and Master Plan (Makerere University, 2001) reports that the University had planned to disburse as much as $10.7 million on ICT related projects for the period from 2000 to 2004. Meanwhile, the University's ICT Policy and Phase II of the Master Plan (Makerere University, 2004) reported that donors and Makerere itself had actually mobilized $8.47 million for ICT projects for the period from the same period, 2000 to 2004. These are staggering sums by standards of an institution in a young country. It is therefore appropriate to isolate the reasons why students in Makerere University are slow to embrace use of ICT.

Theory

On the theoretical/ conceptual side, the study considered computers as an innovation and basing on Rogers' Innovation Diffusion Theory (IDT), built a conceptual framework that explained adoption of computers as dependent on interaction with ICT change agents, ICT training and age. According to Rogers (2003), IDT was proposed by Rogers himself in 1958 after his doctoral studies (1953-1955) on adoption of agricultural innovations in Iowa State University, US. The theory stipulates that an individual's propensity to adopt or use any innovation such as computers, depends on the individual characteristics of that person. Such individual characteristics according to the Theory include the extent to which that person interacts with change agents of relevance to the innovation in question; the level of training of relevance to the innovation the person has received; and how old the person is. If the person interacts much with change agents of relevance to the innovation in question, then that person will have high propensity to use the innovation. If the person has a high level of training of relevance to the innovation, then that person will have high propensity to use the innovation. The older a person becomes, the less that individual will be attracted to use innovations. On the basis of that Theory, this study proposes that use of computers (an innovation) by a student, could be related to individual characteristics of that student, namely interaction with ICT change agents, level of ICT training and age.

Related Literature

Interaction with Change Agents and Use of Innovations

Rogers (2003) defines a change agent or champion as an "individual who influences clients' innovation-decisions in a direction deemed desirable by a change agency" (p. 366). Rogers (2003) goes on to observe that many different occupations fit that definition of change agent: teachers, consultants, public health workers, agricultural extension agents, development workers, and sales people. "All these change agents provide a communication link between a resource system with some kind of expertise and a client system" (p. 368). On the importance of change agents and/ or champions in a change effort, Rogers (2003) asserts that "earlier adopters have more contact with change agents than do later adopters" (p. 291). However, Rogers (2003) cautions that, the mere presence of a change agent is not a guarantee for the success of a change effort, suggesting some twelve conditions for the success of a change agent, namely: (i) being hard working (ii) being client-oriented rather than change agency-oriented (iii) being compatible with client needs (iv) being empathetic with clients (v) having homophile with clients (vi) having to work through opinion leaders (vii) being credible in the clients' eyes (viii) trying to increase client ability to evaluate innovations (ix) having a high social status among clients (x) allowing high social participation (xi) having high education and literacy and (xii) being cosmopolitan.

Studies relating interaction with change agents or champions and use of innovations can be found. For example, Drent and Meelissen (2008) in their mixed-method (i.e. both quantitative and qualitative) study of teacher educators in Netherlands, came to the finding that teacher educators who used ICT innovatively in the learning process (i.e. going beyond simple applications such as word processing to using a variety of ICT applications to facilitate student learning) were characterized by being "willing to keep extensive contacts with colleagues and experts in the area of ICT for the sake of… own professional development" (p. 197). Colleagues and experts in the area of ICT contacted are presumed to be ICT change agents. El-Gayar, Moran and Hawkes (2011) in their study of students' acceptance of tablet PCs (TPC) and implications for educational institutions at a Midwestern public university in US, used Structural Equation Modelling to show that;

> social influence ha[d]… proven to be a significant [of TPC acceptance]. Consistent with hypothesis…, the degree by which a

> student perceive[d] the importance of how significant others (such as peers and faculty perceive him or her using the technology, positively influence [d] his or her… acceptance of TPC (p. 66).

The said peers and faculty are presumed in this paper to be "change agents or champions" positively influencing acceptance of TPC. Jaidee and Beaumont (2005) in their qualitative study of factors affecting small to medium manufacturing enterprises (SMMEs) in adopting business-to-business electronic commerce (B2BEC) in Thailand, found that influence of trading partners, presumably change agents, positively influenced the decision of owners/ managers to adopt B2BEC. Theoretical and empirical support for "change agents or champions" as a positive correlate of adoption of innovations is thus overwhelming. Hence in this paper, it is being hypothesized that interaction with ICT change agents is a positive correlate of use of computers.

Training and Use of Innovations

Buckley and Caple (2000) define "training" as a planned and systematic effort to modify or develop knowledge, skills or attitude through learning experience, to achieve effective performance in an activity. Thus, training in a work situation is concerned with extending and developing employees' capabilities and enabling them perform better in their jobs. Buabeng-Andoh (2012) on his part, observes that teachers' professional development is a key factor to successful integration of computers into classroom teaching. They cite several studies as having revealed that whether beginner or experienced, ICT-related training programs develop teachers' competencies in computer use, influence teachers' attitudes towards computers as well as assisting teachers reorganize the task of technology and how new technology tools are significant in student learning. Several researchers (e.g. Garcia-Valcarel & Tejedor, 2009; Hung, Hung, Tsai & Jiang, 2010; Stuart, Mills & Remus, 2009) established training to be a positive correlate of adoption of innovations.

For example Garcia-Valcarel and Tejedor (2009) in their study of training demands of lecturers related to use of ICT among staff of University of Salamanca, Spain established ICT training as a positive correlate of adoption of ICT. For example from their interviews of teachers, they established that "lecturers who do not use them [ICT] in teaching included among their reasons lack of… knowledge" (p. 179). Hung et al (2010) in their study of critical factors of hospital adoption of Customer Relationship Management (CRM) in Taiwan, used

Discriminant Analysis to establish that information system capabilities of staff, which only come through training, had significant influence on the adoption of CRM. Stuart et al (2009) in their quantitative study of primary school leaders in New Zealand used Partial least Squares (PLS), a form of Structural Equation Modelling (SEM) to show that "ICT use was significantly linked to ICT knowledge… and ICT experience" (p. 739), which knowledge and experience comes from ICT training. Thus Stuart et al (2009) established ICT training to be a positive correlate of adoption of ICT. From the literature, it is being proposed that ICT training is a positive correlate of use of computers.

Age and Use of Innovations

Schiffman and Kanuk (2004) observe that age of the consumer innovator is related to the specific product category in which the consumer innovates, with consumer innovators tending to be younger than either late adopters or innovators because many of the products selected for research attention such as fashion and automobiles, are particularly attractive to young consumers. Kok, Kee, Ping, Khalid and Yu (2011) while quoting relevant studies propose that "youthful managers are more appealing to fresh and unique ideas, and more willing take risks than older managers. The older managers are slow to adopt new technology unless they believe that there is an advantage in adopting the new technology" (p. 303). Several studies have established age to be a negative correlate of adoption of innovations.

For example, Kok et al (2011) used Multiple Regression to identify determinants of internet adoption in Malaysian audit firms, and established that "age of audit partners are significantly [negatively] associated with internet adoption" (p. 302). Some studies have established age to be only an indirect correlate of adoption of innovations. For example, Sim, Tan, Ooi and Lee (2011) in a study exploring individual characteristics on adoption of broadband using the largest private university in Malaysia, used Multiple Regression to establish that age was an indirect correlate of adoption by mediating each of perceived usefulness (PU) and perceived case of use (PEU), each of which in turn, significantly related to behavioural intention (BI) to use broadband. However some studies did not find age to correlate with use of innovations.

For example, Educause Centre for Applied Research, ECAR (2010) in their mixed (i.e. quantitative and qualitative) study of technology adoption and ownership of IT among undergraduates in the US, reported finding "no meaningful difference between freshmen and

senior respondents regarding their ownership of desktops…" (p. 44). On adoption of mobile Internet, they said "we found no common demographic or other characteristic of… non-users, including… age…"(p. 49). However some studies have found age to actually be a positive correlate of adoption of innovations. For example Billon, Marco and Lera-Lopez (2009) in their study of disparities in ICT adoption, used Canonical Correlation to establish that "in developing countries, population age… positively associated with… ICT adoption" (p. 596). Thus as Rogers (2003) observes, "there is inconsistent evidence about the relationship of age and innovativeness" (p. 288), that is readiness to adopt of innovations. Nevertheless, because of overwhelming empirical support, it is still being hypothesized that age is an inverse correlate of use of computers.

Method

Design

The study took the quantitative approach or paradigm in that it was based on variables measured with numbers and analysed with statistical procedures. In particular the study was a correlational, cross-sectional survey. It was correlational in that it was interested in relating each of three numerical independent variables (interaction with ICT change agents, ICT training and age) to an equally numerical dependent variable (use of computers). The study was a survey in that it involved a relatively large number of respondents, and cross-sectional in so far as pertinent data were collected from all respondents once and for all to reduce on time and costs involved.

Sample

The target population in the study was constituted by all Masters students in School of Education, Makerere University, in a recent academic year. However because of constraints, the accessible population was constituted by only those Masters students in their first year who were all doing their Research Methods paper who numbered about 100. However given the relatively small population, and given that not all respondents would return the instruments given to them, all first year Masters students were included in the targeted study sample. Unfortunately, only 69 of the students responded, giving an overall response rate of about 69%.

Instrument and Procedures

Data were collected using a self-administered questionnaire (see Appendix) with items on course of study, age, sex and income level. It had a question on whether or not a respondent had any ICT change agents in their department; a question on whether or not a respondent had any ICT qualification; five items on use of computer hardware; eight items on use computer applications software; and 11 items on use of ICT communication facilities. In terms of procedure, the "captive audience" method was used in that respondents were asked before one of their Research Methods lectures to answer the questionnaire and return it there and then, thus minimizing non-response.

Data Management

The data collected were processed and then analysed. The data on returned questionnaires were edited, coded and entered into computer using the Statistical Package for Social Sciences (SPSS). Validity and reliability of data collected were ascertained using Factor Analysis and Cronbach Alpha respectively. Means were used for descriptive data analysis, while t test, Analysis of Variance helped with preliminary test of hypotheses at bivariate level. Correlation was used to test for absence of multicollinearity among independent variables, while Regression Analysis helped with confirmatory test of hypotheses at multivariate level.

Results

Profile of Respondents

Details on background characteristics of the sample of 69 Masters students, are given in Table 1, which suggests that the typical respondent was doing a Masters in Education (55%), aged between 25 and 40 years (81%), male (55%), and of medium income (over 66%).

Table 1: Descriptive statistics for personal information of the respondents

Description	Category	Frequency	Percentage
Course	M Ed *	38	55.1
	M Ed ICT	3	4.3
	M A Educ Mgt	19	27.5
	M A Educ Policy & Planning	5	7.2
	M Sc Human Resource Mgt	4	5.8
Age group in years	Up to 25	7	10.4
	25 but below 40	54	80.6
	40 and above	6	9.0
Sex	Female	31	44.9
	Male	38	55.1
Income level	Low	22	32.4
	Medium	45	66.2
	High	1	1.5

**Curriculum, Teaching & Media; Foundations; Language & Literature; Psychology; Science; Social Science & Arts*

Dependent Variable: Use of Computers

Use of computers was conceptualized in terms of use of hardware (five items), applications software (eight items), and communication facilities (11 items) respectively. Each item was scaled in such a way that 1 = Very rarely or never, including never heard of it; 2 = Rarely use; 3 = Neither rarely nor regularly; 4 = Regularly; and 5 = Very regularly.

Use of Hardware

Table 2 presents the study items for the first aspect of the dependent variable (DV_1) in the study, namely "use of hardware" (H), their means, factor loadings and Cronbach alphas. Means on items in Table 2 were at most "3" which on the rating scale used corresponded to "fair", meaning that most items of hardware recorded rare and hence, poor levels of use. To establish construct validity, Factor Analysis was used to extract one component from the five items on DV_1, having an eigenvalue of 2.958 and explaining over 59% of variance in the construct. Considering factor loadings above 0.5 as being high (Foster, 1998), it is apparent that the component loaded highly on all items of use of hardware (H), meaning that all five items were valid. Cronbach alpha had already been computed as 0.8261, which was high since it exceeded 0.7 (Hair, Anderson, Tathan & Black, 1998), suggesting that the five items (H1 through H5) were reliable measures of the construct. An overall average index "Hardware" on the five items, had a mean of 2.19, which was about "2" which on the rating scale used, corresponded

to "rare" and hence poor levels of use. Thus the hardware aspect of use of computers was rated "poor".

Table 2 Means, validity and reliability analyses on use of hardware

Construct	Item	Mean	Component [+]	Cronbach α
H	H1	3.06	0.863	0.8261
	H2	2.64	0.873	
	H3	1.64	0.728	
	H4	2.12	0.785	
	H5	1.48	0.550	
Eigenvalue			2.958	
% variance			59.153	

[+] Only factor loadings above 0.5 reflected (as per Foster, 1998).

Use of Applications Software

Table 3 presents the study items for the second aspect of the dependent variable (DV_2) in the study, namely "use of applications software" (S), their means, factor loadings and Cronbach alphas. Except for items H1 (Operating systems) and H3 (Word processing) which attained fair ratings of use, means on all other items in Table 2 were at most "2" which on the rating scale used corresponded to "rare", and hence, poor levels of use of applications software. To establish construct validity, Factor Analysis was used to extract two components from the eight items on DV_2, with the first having an eigenvalue of 3.816 against 1.375 for the second. The first component explained almost 48% of variance in the construct while the second explained only slightly over 17%.

Considering factor loadings above 0.5 as being high (Foster, 1998), it is apparent that while the first component loaded highly on all items of applications software (S), the second component highly loaded only on the third item (S3, that is, word processing). Such an item as S3 loading highly on more than one component is said to be complex (Moore & Benbasat, 1991, p. 207), and ought to be dropped from analysis. Thus all other items except S3 were considered valid. Having dropped S3, Cronbach alpha originally 0.8254, which was high since it exceeded 0.7 (Hair et al, 1998), was recomputed yielding 0.8067, meaning that dropping the third item (S3) made the measure less reliable, though more valid. An overall average index "Software" on all items on "Software" (S), except S3, had a mean of 1.97, which was about "2" which on the rating scale used, corresponded to "rare" and hence poor levels of use. Thus the applications aspect of use of computers was rated "poor".

Table 3 Means, Validity and Reliability Analyses on Use of Applications Software

Construct	Item	Mean	Component +		Cronbach, α
			(1)	(2)	
S	S1	2.99	0.644		0.8254 **
	S2	2.36	0.646		0.8067 ***
	S3*	3.36	0.629	0.518	
	S4	2.16	0.736		
	S5	1.61	0.718		
	S6	1.74	0.779		
	S7	1.51	0.675		
	S8	1.41	0.684		
Eigenvalue			3.816	1.375	
% variance			47.695	17.193	

+ Only factor loadings above 0.5 reflected (as per Foster, 1998).
* Dropped from analysis due to complexity
** Before dropping complex item
***After dropping complex item

Use of ICT Communication Facilities

Table 4 presents the study items for the third aspect of the dependent variable (DV_3) in the study, namely "use of communication facilities" (C), their means, factor loadings and Cronbach alphas. Except for items C4 (Email) and C5 (Web surfing) which attained fair ratings of use, means on all other items in Table 2 were at most "2" which on the rating scale used corresponded to "rare", and hence, poor levels of use of ICT communication facilities. To establish construct validity, Factor Analysis was used to extract three components from the 11 items on DV_3, with the first having an eigenvalue of 3.858 against 2.13 and 1.317 for the second and third components. The first component explained over 35% of variance in the construct while the second and third explained only slightly over 19% and almost 12% respectively of the variance.

Considering factor loadings above 0.5 as being high (Foster, 1998), it is apparent that while the first component loaded highly on all items of ICT communication facilities (C) except the first (C1) and third (C3). The second component highly loaded on only five items (C3 to C5, C7 and C8), while the third component loaded highly on only three items (C1 and C2). Thus complex items loading highly on more than one component (Moore & Benbasat, 1991, p. 207), namely C2, C4, C5, C7 and C8 were dropped from analysis. Also items C1 and C3 were dropped because they did not load highly on the main component. Thus only the remaining items (C6, C9 to C11) were considered valid. Having dropped items, Cronbach alpha originally 0.7959, which was high since it exceeded 0.7 (Hair et al, 1998), was recomputed yielding 0.7845, meaning that dropping items made the measure less reliable, though

more valid. An overall average index "Comm" on remaining four items on "use of ICT communication facilities" (C), had a mean of 1.73, which was about "2" which on the rating scale used, corresponded to "rare" and hence poor levels of use. Thus the ICT communication aspect of use of computers was rated "poor".

Table 4 Means, Validity and Reliability analyses on use of ICT communication facilities

Construct	Item	Mean	Component +			Cronbach α
			(1)	(2)	(3)	
C	C1#	2.29			0.715	0.7959 **
	C2*	2.20	0.594		0.605	0.7845 ***
	C3#	1.28		0.587		
	C4*	3.36	0.555	-0.639		
	C5*	3.45	0.571	-0.585		
	C6	1.64	0.682			
	C7*	1.23	0.56453	0.695		
	C8*	1.23	0.528	0.680		
	C9	1.80	0.762			
	C10	1.61	0.659			
	C11	1.88	0.728			
Eigenvalue			3.858	2.13	1.317	
% variance			35.072	19.364	11.972	

+ Only factor loadings above 0.5 reflected (as per Foster, 1998).
\# Dropped from analysis due to low load on main component
* Dropped from analysis due to complexity
** Before dropping complex items
*** After dropping complex items

Index on Use of Computers

To get an overall picture of how respondents rated themselves on use of computers, an average index "Computer" was computed from the three indices (Hardware, Software and Comm) from Tables 2, 3 and 4, and found to have a mean = 1.96, which as per the used scale was suggesting that overall, the majority of respondents rarely used computers.

Bivariate Analyses

Interaction with ICT Change Agents and Use of Computers

The first hypothesis (H1) in the study was that interaction with ICT change agents positively correlated with use of computers. Respondents were thus prompted to state whether or not, in their observation, their department had an ICT change agent(s), that is, a person(s) promoting

the cause of ICT. Table 5 gives pertinent summary statistics and Fisher's ANOVA, where the three sample means suggest that use of computers did not significantly change with interaction with ICT change agents (F is small given that its significance level is small, $p > 0.05$). Thus ANOVA is suggesting that the first research hypothesis, H1 be rejected at the five percent level of significance ($p > 0.05$).

Table 5: Statistics and ANOVA results on use of computers by interaction with ICT change agents

Any interaction with ICT change agents?	Count	Mean	Standard Deviation	F	p
No	17	1.96	0.81	0.155	0.857
Yes	46	1.98	0.65		
Not observant	6	1.81	0.60		
Total	69	1.96	0.68		

ICT Training and Use of Computers

The second hypothesis (H2) in the study was that ICT training positively related to use of computers. Respondents were thus prompted using one item to rate themselves on level of ICT training, by stating whether they had any ICT qualification or not. Pertinent summary statistics and t test results are given in Table 6, where the two sample means suggest that holders of an ICT qualification were better users of computers than those who did not. However, the small value of t ($p > 0.05$) suggests that H2 be rejected at the five percent level of significance ($p > 0.05$).

Table 6: Summary statistics and t-test results on use of computers by ICT training

Hold any ICT qualification?	Count	Mean	Standard deviation	t	p
No	39	1.86	0.70	-1.444	0.153
Yes	30	2.10	0.65		

Age and Use of Computers

The third hypothesis (H3) in the study was that age was inversely related to use of computers. Respondents were thus prompted to state their ages in years. Pearson's Linear Co-relation Coefficient was used to correlate the two numerical variables, namely age and use of computers ("Computer"), yielding $r = -0.372$, suggesting acceptance H3 at the one percent level of significance ($p < 0.01$).

Multivariate Analysis

Bivariate analyses in Section 6.0 suggested that only age seemed a potential correlate of use of computers. However to establish the real correlates, use was made of a more powerful multivariate tool, Multiple Regression Analysis, which took into account simultaneous relationships of the many variables thus documenting collective effects and accounting for potentially spurious factors (Sweet & Grace-Martin, 2003).

Creation of Dummies

But before fitting the multiple regression model, independent variables were treated as follows: Because of its categorical nature, a dummy was created from Table 5 for interaction with ICT change agents (0 = none or not observant; 1 = yes). Similarly, a dummy was created from Table 6 for possession of an ICT qualification (0 = none; 1 = yes). Being a continuous variable, age was used in the model as given by the respondents with no modification.

Test for Multicollinearity

To check whether the independent variables were not highly related, that is suffering multi-collinearity, in which case they would distort multiple regression results (Sweet & Grace-Martin, 2003), correlations were run using Karl Pearson's linear correlation as shown in Table 8. The resultant correlation matrix, suggested that none of the pairs of IVs was highly correlated. For example the correlation between "change agent dummy" and "ICT qualification dummy" ($r = -0.062$) was insignificant ($p > 0.05$). Similarly, the correlation between "change agent dummy" and age ($r = -0.048$) was insignificant ($p > 0.05$). So was the correlation between "ICT qualification dummy" and age ($r = -0.016$; $p > 0.05$). Thus the three independent variables were free from muliticollinearity.

Table 8: Correlation Matrix for independent variables

		IV1	IV2	IV3
Change agent dummy	(IV1)	1		
ICT qualification dummy	(IV2)	-0.062	1	
		(0.613)		
Age	(IV3)	-0.048	-0.016	1
		(0.702)	(0.896)	

p values are bracketed, while r values are not

Table 9 gives the multiple regression analysis of the dependent variable, DV (average index on use of computers, Computer) on the three individual characteristics. The significance level (F = 4.666) suggested that the relationship between DV and the three IVs was significant at the one percent level of significance ($p < 0.01$), with the adjusted R square ($R^2 = 0.143$) indicating that slightly over 14% of the variation in the DV could be attributed to those three IVs. Significance (p) values suggested that of the three IVs, only age (Beta, $\beta = -0.369$; $p < 0.01$) was a significant negative ($r < 0$) correlate of the DV. In other words, Multiple Linear Regression confirmed what was suggested by Correlation Analysis to the effect that H1 and H2 be rejected, while H3 is accepted.

Table 7: Regression Results of Use of Computers on Individual Characteristics

Individual characteristic	β	P
ICT change agent dummy	-0.007	0.952
ICT training dummy	0.207	0.074
Age of respondent (yrs)	-0.369	0.002

F = 4.666 (p = 0.005); Adjusted R square = 0.143

Discussion

Interaction with ICT Change Agents and Use of Computers

The first hypothesis (H1) in the study namely that interaction with ICT change agents positively correlated with use of computers, was not supported by the findings, which was also inconsistent with findings of earlier studies (e.g. Drent & Meelissen, 2008; El-Gayar et al, 2011; Jaidee & Beaumont, 2005). The findings are thus challenging theoretical assertions such as that by Rogers (2003) to the effect that a potential adopter who has more contacts with a change age is more likely to benefit from the technological or technical knowledge of the agent and therefore to be more innovative than those with fewer contacts. This lack of significance of ICT change agents might be in support of Roger's (2003) assertion that mere presence of change agents is not adequate unless they are hard working, compatible with client needs, credible in the eyes of clients and allowing social participation; may be Makerere ICT change agents are not doing these. The finding leads to one major recommendation namely that, ICT change agents in the School be more hard working, compatible with client needs, credible in the eyes of clients and allowing social participation on ICT matters.

ICT Training and Use of Computers

The study set out to test whether ICT training positively correlated with use of computers, which hypothesis was not supported by the findings. This was not in congruence with past studies such as Garcia- Valcarel and Tejedor (2009), Hung et al (2010) and Stuart et al (2009). This finding is contradicting with theoretical assertions to the effect that training is directed at changing people's attitudes, enabling employees to be more adaptable and as technological advances continue, enabling employees to cope with change (Buckley & Caple, 2000; Buabeng-Andoh, 2012). May be the anomalous finding is suggesting that certificates held by Masters students in the School surveyed are so elementary that they cannot positively tilt the use of computers scale in favour of those who hold them. To find out the nature of certificates held could be food for thought for future researchers. Meanwhile the study led to the conclusion all Masters students in the School be offered same encouragement and/ or assistance with regard to ICT without due regard to their earlier ICT qualifications.

Age and Use of Computers

The study findings agreed with the initial hypothesis that age is negatively related to use of computers, consistent with several past studies (e.g. Kok et al, 2011; Sim et al, 2011). The finding concurs with theoreticians such as Schiffman and Kanuk (2004) who observe that age is an important correlate of use of innovations, with consumer innovators tending to be younger than late adopters or innovators. It is thus recommended that to improve use of computers among Masters students in the School, stakeholders such as Dean, deputy deans and heads of department should give extra encouragement and/ or assistance to the aged and ageing students.

Conclusion

Use of computers and/ or ICT has innumerable benefits such as raising student efficiency by for example making a student work faster and with increased accuracy. Computers have raised productivity of students by for example making them more versatile, that is able to do more than one job, say in the case of a computer which allows a student to be an own secretary and filing clerk. Unfortunately however, use of computers and/ or ICT by students in Makerere University has consistently been reported to be very low. Thus studies geared towards isolating factors positively relating with use of computers are important.

This paper reports on a survey on use of computers in School of Education, Makerere University carried out with the purpose of linking use of computers to interaction with ICT change agents, ICT training and age. In so doing the study closed several gaps. For example, the study was among the few done in the area of use of computers in Makerere University to those three correlates. The main findings of the study were that while interaction with ICT change agents and ICT training were not correlates of use of computers, age was a significant negative correlate of the same. These findings especially the third one, have practical significance to ICT change agents in Makerere University and comparable institutions of higher learning. In particular the finding that there was significant negative correlation between age and use of computers, implies that stakeholders such as the Dean of School need to give preferential ICT support to aged and ageing Masters students if they are to effectively use computers.

However, despite its contribution, this study is not without limitations. For example the study used only three independent variables, yet there are other variables that could potentially relate to use of computers. Future studies should integrate more of these independent variables. The study was based on data collected from only one group of Masters students, from one school of the University. Thus the study left out a sizeable portion of Masters students and indeed graduate students in the University. Thus generalization of research findings to all Masters and graduate students in the University should be done with caution! Further, the study was quantitative, which prompts the proposition that future studies may at least combine the quantitative paradigm with the qualitative one to get a more full picture of the phenomenon. However despite the above shortcomings, the study has contributed to the debate on factors related to use of computers.

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Appendix
Study Questionnaire

Background Variables (BV)
Please help us classify your responses by supplying the following facts about yourself:
BV1 Your course of study
1. Master of Education (Curriculum, Teaching & Media; Foundations; Language & Literature; Psychology; Science; or Social science & Arts)
2. Master of Education (ICT); 3. Master of Arts (Education Management)
3. Master of Arts (Education Policy & Planning)
4. Master of Science (Human Resource Management in Education)

BV2 How old are you (to the nearest whole year)? ……
BV3 What is your sex? 1. Female 2. Male
BV4 How would you rate your income level? 1. Low 2. Medium 3. High

Independent Variable One, IV1: Interaction with ICT Change Agents
According to your observation, does your Department have any ICT change agent or agents, that is a person or persons promoting the sauce of ICT? 1. No 2. Yes 3. Not observant
Independent Variable Two, IV2: Possession of ICT Qualification
Do you hold any ICT qualification? 1. No 2. Yes

Dependent Variable: Use of ICT

Please indicate how often you use a given computer facility using a scale where 1= Very rarely or never, including never heard of it; 2= Rarely; 3= Neither rarely nor rarely; 4= Regularly; and 5= Very regularly

Dependent Variable One, DV1: Hardware (H)

H1 PC in general	1	2	3	4	5
H2 PC printer	1	2	3	4	5
H3 PC scanner	1	2	3	4	5
H4 PC CD-RM and other multimedia components	1	2	3	4	5
H5 PC zip drive	1	2	3	4	5

Dependent Variable Two, DV2: Applications Software (S)

S1 Operating system software (e.g. DOS, Windows)	1	2	3	4	5
S2 Utility software (e.g. anti-virus, disk defragmenters)	1	2	3	4	5
S3 Word processing software (e.g. MS-Word, WordPerfect)	1	2	3	4	5
S4 Spreadsheet software (e.g. MS-Excel, Lotus)	1	2	3	4	5
S5 Database management software (e.g. MS-Access, dBase)	1	2	3	4	5
S6 Graphics software (e.g. CorelDraw)	1	2	3	4	5
S7 Desktop publishing software (e.g. PageMaker, Ventura)	1	2	3	4	5
S8 Statistical or data research analysis software (e.g. SPSS)	1	2	3	4	5

Dependent Variable Three, DV3: ICT Communication Facilities (C)

C1 Local Area Network (LAN) in your School	1	2	3	4	5
C2 Wide Area Network (WAN) in Makerere University	1	2	3	4	5
C3 African Virtual University (AVU)	1	2	3	4	5
C4 Email (sending or receiving messages)	1	2	3	4	5
C5 World wide web (surfing)	1	2	3	4	5
C6 Bulletin board services, mailing lists, discussion groups	1	2	3	4	5
C7 Computer conferencing systems	1	2	3	4	5
C8 Video conferencing systems	1	2	3	4	5
C9 Electronics journals, newsletters (e.g. in Main Library)	1	2	3	4	5
C10 Electronic data base (e.g. in Main Library)	1	2	3	4	5
C11 On-line library catalogs (e.g. in the Library)	1	2	3	4	5