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OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

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DETERMINANTS OF BASIC SCHOOL TEACHERS' LEVEL OF COMPUTER LITERACY IN GHANA

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ABSTRACT

Computer literacy is very important in every aspect of life and its role in education is increasingly becoming more crucial. The purpose of this study was to investigate the effect of gender, subject specialization, teaching experience, and school status on basic school teachers' level of computer literacy in Ghana. The sample of the study covered 30 basic schools (20 public schools and 10 private schools) in Jomoro District in the western region of Ghana. In all 105 teachers participated in the study. An instrument structured on a 4 point likert scale and which yielded reliability coefficients of 0.944 was used to collect data. The study showed that statistically significant differences exist between males and females in their familiarity with some types of Information Communication Technology. More male teachers than female teachers were familiar with Hard disk, RAM, CD-ROM, Monitor, Sound Card, and Joystick. The study also showed that teacher's major subject area and the teaching experience had no effect on their familiarity with Information Communication Technology. Finally, the study also revealed that Public and Private school teachers did not differ significantly in their familiarity with Information Communication Technology. It is recommended that more attention should be paid to Information Communication Technology in the initial teacher training programme in Ghana. The colleges of education must be well equipped with Information Communication Technology facilities so that they can train teachers with good knowledge in Information Communication Technology for our basic schools.

KEYWORDS

Computer literacy level, gender, subject specialization, teaching experience, school status.

INTRODUCTION

t is generally accepted that the use of Information and Communication Technology (ICT) in education can bring about positive changes to the society because computers offer exciting approaches to teaching, which was not even dreamed of two decades ago. However, the extent to which the educational potential of computer technology will be realized depends, to a very large extent, on teachers. The use of computers can turn teaching and learning around and bring about advances that would improve education dramatically. Computer literate individuals will reap greater benefits than their counterparts who lack that knowledge. To promote computer literacy of teachers, governments need to invest considerably in the training of teachers. To evaluate the impact of these investments and thereby help ensure that the intended results are achieved, Information and Communication Technology (ICT) literacy of teachers should be measured periodically. Jay (1981) insisted on the need for personal education in computer technology, and promoting computer literacy for both learners and instructors

The need for personal education in computer technology and the need to promote computer literacy for both learners and instructors within educational institutions is, therefore, very crucial. However, there has been little information related to teachers' level of literacy in basic computer operations and the extent to which variables such as gender, public and private school teachers' level of literacy in computer technology, teachers' major subject area, and years of teaching experience, either jointly or individually predict the basic school teachers' level of computer literacy. It has become important to provide information along this line in order to be able to make recommendations that will promote computer literacy among teachers in Ghana.

REVIEW OF LITERATURE

The diffusion of innovations theory provides the framework for this study. It is a theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures. The diffusion process can be defined as "the spread of a new idea from its source of invention or creation to its ultimate users or adopters" (Rogers, 1962, p. 13). According to Rogers and Shoemaker (1971) cited in Jenkins (2009), there are five categories into which adopters fall based upon their innovativeness: laggards, late majority, early majority, early adopters, and innovators. The positions of the five areas of innovativeness are arranged on a bell curve. According to Rogers (1962), the adoption of an innovation requires a decision by an individual. Individuals must begin using a new idea and allow it to replace the previous idea they were using.

The diffusion of innovations theory can be linked back to teachers' computer literacy, access to and use of technology. Certain indicators emerge to indicate shifts between the five categories of adoption when we analyze prior research related to technology. Daulton (1997) found that in a matter of ten years (1983 to 1993) FCS teachers' technology adoption rates increased from 5% to 83%. This increase shows that as technology became more common in the school setting, teachers moved from the late majority category to the early adopter category. On the strength of this we can say that teachers have the desire to incorporate technology into the classroom (early adopter) but face challenges in acquiring knowledge to do so.

The precise definition of "computer literacy" can vary from group to group. For instance, an experienced computer professional may consider one's ability to do self tuition new programs or tasks to be central to computer literacy. In common discourse, however, "computer literate" often connotes little more than the ability to use several very specific applications for certain very well-defined simple tasks, largely by rote. Real problems can arise when such a "computer literate" person encounters a new program for the first time, and a high degree of "hand-holding" is required.

Mason and McMorrow (2006) suggested two distinct components to computer literacy: awareness and competence. Awareness requires that a person has understanding of how computers impact their day-to-day life as well as that of the larger society. Competence expects a person to be able to exhibit a hands-on expertise with a software application. Both of these components should be evaluated when looking at computer literacy within the classroom setting.

Some of the most basic computer literacy skills include using word processor, email, mailing lists, and the World Wide Web (Manley, et al., 2000). Computer literacy is even thought to be as important as writing, reading, and mathematics in the school setting; as children in today's society have never experienced schools without computers (Croxall & Cummings, 2000). These skills are essential in today's school systems as more tasks are completed using computer technologies.

Acquiring the skills to use instructional technology in the classroom is a necessity in today's society (Robyler et al., 1993). Further, computer literacy is an important component in having the ability to successfully and confidently use technology (Croxall & Cummings, 2000; Eisenberg & Johnson, 1996) within the FCS classroom. Russell's (1995) six-stage process can be used to help teachers develop a better understanding of technological applications, as can attending workshops or taking classes that deal with using technology in the classroom (Redmann & Kotrlik, 2004). Russell's six stages are: awareness, learning the process, understanding and application of the process, familiarity and confidence, adaptation to other contexts, and creative application to new contexts.

Studies have indicated that many different factors can influence an individual's level of computer literacy. As with prose and document literacy. ICT literacy is

Studies have indicated that many different factors can influence an individual's level of computer literacy. As with prose and document literacy, ICT literacy is highly correlated with education and income, both of which are key measure of socio-economic status (Nakhaie, 1998). The same relationships also hold for home computer ownership. However, it is important to note that computer ownership does not necessarily imply strong computer literacy skills.

NEED/IMPORTANCE OF THE STUDY

The outcome of the study would serve as good basis for the development of supportive programmes to basic school teachers which could be replicated in all regions of Ghana. It would also help educational policy makers to plan proper policies on the training of teachers in the proper use of computers and how to use it to enhance teaching and learning in schools. The findings would further help identify teachers who lack necessary competence in integrating ICT in their respective subject areas. Finally, the outcome of the study would serve as a resource material for students who may undertake similar studies in future.

STATEMENT OF THE PROBLEM

It has been observed that teachers do not have the right attitude towards computers and therefore are not motivated to use it in teaching. Modern developments in technology have provided new possibilities to teachers but most of them are not able to take the chance because of lack of computer literacy skills. Furthermore, it is not known whether gender, major subject area, years of teaching experience, and school status affect teachers' levels of computer literacy. It is therefore important to conduct this study to ascertain the reality.

OBJECTIVES

The purpose of the study was to investigate basic school teachers' attitude towards ICT and their computer literacy levels. The study further investigated whether gender, major subject area, years of teaching experience, and school status affect teachers' levels of computer literacy.

HYPOTHESES

The following Hypotheses were formulated and tested:

- 1. Ho: There is no statistically significant difference between male and female teachers' level of literacy in computer technologies.
- 2. Ho: There is no statistically significant difference between public and private school teachers' level of literacy in computer technologies.
- 3. Ho: There is no statistically significant relationship between teachers' major subject area and their level of literacy in computer technologies
- 4. Ho: There is no statistically significant relationship between teachers' years of teaching and their level of literacy in computer technologies

RESEARCH METHODOLOGY

The study basically aims at gathering information on attitude, knowledge and awareness issues of basic school teachers in Jomoro district. The study therefore employed the descriptive survey method. The target population for the study was all the basic school teachers (private and public) in Jomoro district. The pupil/teacher ratio in Jomoro district of kindergarten, primary and junior secondary school in the district were found to be 58:1, 46:1 and 25:1 respectively. The decision to use the basic school teachers in Jomoro District is based on the assumption that they are likely to lack computer knowledge in ICT because the district is more of rural or remote than urban. The stratified random sampling technique, disproportional method, was used to select 30 basic schools from the district. The simple random sampling technique was used to select the quota of respondents from the schools for the study.

A questionnaire developed by the researchers after an elaborate literature review was used to collect data. The questionnaire was divided into two main parts. They are: demographic Information and teachers' level of computer literacy. The items were tested (SPSS v. 17) for reliability using an internal consistency method (Cranach's Alpha coefficient, [Cronbach, 1990]) which yielded reliability coefficients of 0.944.

The questionnaire was administered to the teachers personally in their various schools in two phases. Phase 1 was carried out between 8th March, 2010 and 26th March, 2010 and it covered schools along the southern belt of the district. From Ellonyin through Bonyere, Half Assini to Anlomatuope. The second phase, which started from 30th March, 2010 and ended on 16th April, 2010 captured schools on the northern part of the district; from Adusuazo, Tikobo No.1 up to Elubo. Out of the 120 questionnaires administered, 105 were retrieved thereby recording a return rate of 87.5%

All the items in the questionnaire were computerized using the Statistical Package for Social Sciences (SPSS v17). It involved definition of variables, keying in of the data using codes and editing the data for missing values and correcting them.

RESULTS OF THE STUDY

HYPOTHESIS 1

It was hypothesised that:

Ho: There is no statistically significant difference between male and female teachers' level of literacy in computer technologies.

An independent-sample t-test was used to analyse and test hypotheses 1 and 2. It helped to determine the level of difference, if any, between male and female respondents' literacy level in computers technologies. The result of the independent-sample t-test is shown in Table 1.

TABLE 1: COMPARISON OF MALE AND FEMALE RESPONDENTS ON THEIR LITERACY LEVEL IN COMPUTERS TECHNOLOGIES

Variable	М	SD	t	df	P
Male	1.51	0.50	-2.62	103	*0.010
Female	1.30	0.46			

(* p<0.05) Field data, 2010

Inspection of the two group means indicated that the mean scores in familiarity with ICTs for female respondents (1.30) is significantly lower than the mean score (1.51) for males as seen in Table 20. There was therefore a significant difference between males and females in their familiarity with computers; t(103) = -2.62, p = 0.01. The magnitude of the difference in the means was very small (eta squared = 0.006). This result confirms the chi-square findings in research question 5 that, significant differences were found to exist between males and females in their familiarity with some types of ICTs. More male teachers than female teachers were familiar with Hard disk, RAM, CD-ROM, Monitor, Sound Card, and Joystick.

Specifically, the significant difference was recorded in only 5 out of the 19 hardware items. The result of items which showed the differences in their familiarity with ICTs is shown in Table 2.

TABLE 2: COMPARISON OF MALE AND FEMALE RESPONDENTS ON THEIR FAMILIARITY WITH ICT HARDWARE WHICH HAD THE HIGHEST SELECTION

Items	М	SD	t	df	P
Hard disk					
Male	1.23	.426	-3.77	99	*0.01
Female	1.61	.497			
RAM					
Male	1.47	.503	-2.93	98	*0.00
Female	1.79	.418			
Monitor					
Male	1.07	.254	-2.13	99	*0.00
Female	1.21	.418			
Sound card					
Male	1.55	.501	-2.90	99	*0.00
Female	1.82	.390			
Joystick					
Male	73	1.67	-2.29	99	*0.00
Female	28	1.89			

(* p<0.05) Field data, 2010

As seen from Table 2, more males respondents were more familiar with Hard disk t(99) = -3.77, p = 0.01, RAM t(98) = -2.93, p = 0.00, Monitor t(99) = -2.62, p = 0.00, Sound Card t(99) = -2.90, p = 0.00 and Joystick t(99) = -2.29, p = 0.00 than females respondents. Hence the study failed to accept the null hypotheses that 'There is no statistically significant difference between male and female teachers' level of literacy in computer technologies'

HYPOTHESIS 2

Ho: There is no statistically significant difference between public and private school teachers' level of literacy in computer technologies.

To test hypotheses 2, again an independent samples t-test was conducted to compare the means of public and private schools familiarity with ICTs. Table 3 shows the results of the independent sample t-test on the 19 items between public and private schools respondents.

TABLE 3: COMPARISON OF PUBLIC AND PRIVATE SCHOOLS RESPONDENTS ON THEIR FAMILIARITY WITH ICTS

	Public		Private			
Variable	М	SD	М	SD	T	р
Hard disk	1.31	.467	1.38	.490	66	.51
RAM	1.57	.500	1.58	.501	08	.94
CD-ROM	1.46	.502	1.36	.486	.98	.34
CD (Compact disc)	1.08	.277	1.15	.362	-1.07	.29
DVD	1.11	.321	1.13	.339	20	.84
Floppy Disk	1.46	.502	1.33	.478	1.24	.22
Keyboard	1.03	.178	1.08	.267	97	.33
Mouse	1.06	.248	1.10	.304	65	.52
Monitor	1.08	.277	1.15	.362	-1.07	.29
Printer	1.15	.358	1.08	.267	1.10	.28
Scanner	1.41	.496	1.35	.483	.60	.55
Sound card	1.66	.479	1.60	.496	.56	.57
TV /Radio Card	1.49	.504	1.49	.506	.06	.97
Microphone/Speaker	1.16	.373	1.15	.362	.19	.85
Digital camera	1.28	.452	1.21	.409	.82	.41
Joystick	1.77	.424	1.68	.474	1.06	.29
Optical scanner	1.85	.358	1.78	.423	.99	.33
Overhead projector	1.66	.479	1.85	.362	-2.19	.06
Modem	1.80	.403	1.70	.464	1.14	.26

Results of the analysis in Table 3 shows that differences in all the 19 items tested under familiarity with computers between public and private schools were not statistically significant. From Hard disk through to Modem, none of them showed any statistically significant difference in their test scores. They all showed a *p* value greater than **0.5**. By the results of the analysis, the study accepts the null hypothesis that there is no statistically significant difference between public and private school teachers' level of literacy in computer technologies

HYPOTHESIS 3

Ho: There is no statistically significant relationship between teachers' major subject area and their level of literacy in computer technologies

The relationship between respondents' subject area of specialisation and their familiarity with computers was investigated using the standard multiple regression (simultaneous) approach. The ICT selected for the regression analysis was based on the most selected hardware (items that received 15% selection and above) for classroom teaching. These ICT included Hard disc, Monitor, Mouse, Keyboard and Printer. The researcher checked to see if the data met the assumptions of multiple linear regressions. The tests for normality, homoscedasticity, and multicollinearity all resulted in normal outcomes. The means, standard deviations, and intercorrelations of the analysis can be found in Table 4.

TABLE 4: MEANS, STANDARD DEVIATION, AND INTERCORRELATION FOR MAJOR SUBJECT AREA AND PREDICTORS VARIABLES (N = 88)

			Intercorrelations					
Variable M SD Hard disk				Monitor	Mouse	Keyboard	Printer	
Hard disk	1.35	.48		.46	.40	.30	.26	
Monitor	1.10	.31	.46		.73	.65	.23	
Mouse	1.08	.27	.40	.73		.74	.42	
Keyboard	1.05	.21	.30	.65	.74		.27	
Printer	1.11	.32	.26	.23	.42	.27		

Correlation is significant at the 0.05 level (2-tailed). Field data, 2010

Table 4 shows that only mouse correlated positively (low) with subject area of specialization (r = .07), though not statistically significant. The rest of the predictors showed negative correlation with subject area of specialization, yet they are also statistically not significant. Table 23 also shows that the predictive variables are not significantly correlated with each other. Therefore it can be concluded from Table 23 that the predictive variables (Hard disk, Monitor, Mouse, Keyboard, and Printer) are not statistically significantly correlated with subject area of specialisation which is the dependent variable for familiarity with

computers; F(5, 82) = 1.08, p > 0.05. From the analysis, F = 1.08 and is not statistically significant (p = 0.38). This indicates that the combination of all the predictors (Hard disk, Monitor, Mouse, Keyboard, and Printer) on subject area of specialization do not significantly correlate with respondents' familiarity with computer technologies.

The standard multiple regression analysis was conducted to determine the amount of variance in respondents' subject area of specialization in relation with familiarity with ICTs that can be explained by the variables in this study. The beta coefficients are presented in Table 5.

TABLE 5: SIMULTANEOUS MULTIPLE REGRESSION ANALYSIS SUMMARY FOR HARD DISK, MONITOR, MOUSE, KEYBOARD, AND PRINTER PREDICTING FAMILIARITY WITH ICTs (N = 88)

TAMERICA (N = 66)								
Variable	b	SE <i>b</i>	в	t	sig			
Constant	38.82	19.82		1.96	.06			
Hard disk	2.16	8.30	.032	.26	.80			
Monitor	-30.89	18.09	29	-1.71	.09			
Mouse	45.04	23.55	.38	1.91	.06			
Keyboard	-26.89	25.53	17	-1.05	.30			
Printer	-10.12	12.29	10	82	.41			

Note: $R^2 = .01$; F(5, 82) = 1.08, p > 0.5 Field data, 2010

All the predictors had **p** values greater than 0.05 which is the error margin allowed in the test (0.005 alpha levels). This is an indication that, none of the predictors contribute significantly to the prediction of respondents subject areas in relation with familiarity with ICTs. The adjusted R squared value was 0.005. This indicates that only 0.5% of the variance in subject area of specialization on familiarity with computers can be predicted from the combination of Hard disk, Monitor, Mouse, Keyboard, and Printer. It also shows that only 0.5% of the variance in subject area of specialization on familiarity with computers technologies was explained by the model. According to Cohen (1998) this is a very small effect. Since the t-statistic (1.08) is not statistically significant (p=0.38), the null hypothesis which states that there is no statistically significant relationship between teachers' major subject area and their level of literacy in computer technologies is accepted.

HYPOTHESIS 4

Ho: There is no statistically significant relationship between teachers' years of teaching and their level of literacy in computer technologies

To test hypothesis 4, standard multiple regression was again used in the analysis of the responses. Also, the ICTs used for the regression analysis was based on the most selected hardware used in hypothesis 3. These ICTs included Hard disc, Monitor, Mouse, Keyboard and Printer. The researcher checked to see if the data met the assumptions of multiple linear regressions. The tests for normality, homoscedasticity, and multicollinearity all resulted in normal outcomes. The means, standard deviations, and intercorrelations of the analysis can be found in Table 6.

TABLE 6: MEANS, STANDARD DEVIATION, AND INTERCORRELATION FOR YEARS OF TEACHING AND PREDICTORS VARIABLES (N = 97)

			Intercorrelations						
Variable	М	SD	Hard disk Monitor Mouse Keyboard				Printer		
Hard disk	1.33	.47		.41	.40	.30	.30		
Monitor	1.10	.31	.411		.69	.61	.20		
Mouse	1.07	.26	.40	.69		.74	.40		
Keyboard	1.04	.20	.29	.61	.74		.25		
Printer	1.11	.32	.30	.20	.40	.25			

Correlation is significant at the 0.05 level (2-tailed). Field data, 2010

Table 6 shows that hard disk and monitor correlated positively (low) with years of teaching experience (r = .18 and .06 respectively), though not statistically significant. The rest of the predictors; keyboard and printer, showed negative correlation with years of teaching experience, yet they are also statistically not significant.

Table 6 shows that the predictive variables (Hard disk, Monitor, Mouse, Keyboard, and Printer) are not statistically significantly correlated with years of teaching experience which is the dependent variable for familiarity with computers. Table 30 also shows that none of the predictive variables are significantly correlated with each other. When the combination of all the predictors (Hard disk, Monitor, Mouse, Keyboard, and Printer) were entered into the model simultaneously to predict whether the respondents' years of teaching experience correlate with their familiarity with ICTs, it showed no statistically significant correlation, F(5, 91) = 2.28, p > 0.05. From the analysis, F = 2.28 and is not statistically significant (p = .06). This indicates that the combination of all the predictors (Hard disk, Monitor, Mouse, Keyboard, and Printer) on years of teaching do not significantly influence respondents' familiarity with computer technologies. The standard multiple regression analysis was conducted to determine the amount of variance in respondents' years of teaching in relation with familiarity with ICTs that can be explained by the variables in this study. Table 7 shows the beta coefficients of the analysis.

TABLE 7: MULTIPLE REGRESSION ANALYSIS SUMMARY FOR HARD DISK, MONITOR, MOUSE, KEYBOARD, AND PRINTER PREDICTING FAMILIARITY WITH ICTs (N = 97)

Variable	b	SE <i>b</i>	в	t	sig
Constant	1.63	.45		3.66	.00
Hard disk	.40	.18	.25	2.20	.030
Monitor	.57	.36	.23	1.56	.12
Mouse	95	.52	32	-1.82	.07
Keyboard	22	.58	06	37	.71
Printer	16	.27	06	58	.56

Note: $R^2 = .062$; F(5, 91) = 2.28, p > 0.5 Field data, 2010

The predictors had *p* values greater than 0.05 which is the significant value allowed in the test. This is an indication that, none of the predictors contributes significantly to the prediction of respondent's years of teaching experience on familiarity with ICT. The adjusted R squared value was .062. This indicates that only 6.2% of the variance in years of teaching experience on familiarity with computer technologies was explained by the model. According to Cohen (1998) this is a very small to medium effect.

Since the t-statistic (2.28) is not statistically significant (p= 0.06), the null hypothesis which states that there is no statistically significant relationship between teachers' years of teaching and their level of literacy in computer technologies is accepted.

DISCUSSION OF RESULTS

This study suggests that there is a disparity among male and female teachers concerning their level of computer literacy in the district. There is statistically significant difference between male and female respondents' familiarity with computer technologies. More male teachers than female teachers were familiar with Hard disk, RAM, CD-ROM, Monitor, Sound Card, and Joystick. This seems not to be a surprise as this is consistent with earlier studies. Shashaani & Khalili, (2001) and a recent study by Broos (2005) also found significant gender differences - favouring males in terms of attitudes toward new communications technology, the extent of computer use and self-perceived computer experience. Even when females perceived themselves as being more competent in using computers, they expressed higher computer anxiety levels compared to males.

Although the result may not provide a conclusive evidence of specific gender disparity, Broos (2005), indicated that gender disparity in the use of IT for educational purposes existed to a certain extent. This is definitely a cause for concern as IT is considered a crucial tool for effective teaching and learning in most curricula. Chen (1985) on the other hand found that females and males responded with similar levels of interest toward computers when they possessed similar amounts of computer experience. In effect, lack of technical and theoretical knowledge is a barrier to the use of Computer-assisted Learning technology. It is however refreshing to note that Shashaani, (1997 had identified that the gender gap can be narrowed when both genders are exposed to the same amounts and types of experiences when using computers

The study also revealed that there is no statistically significant relationship between respondents' years of teaching and their familiarity with computer technologies. There is also no statistically significant relationship between respondents' majoring subject area and their familiarity with computer technologies. The results of the analysis for school status revealed that the two groups of schools did not differ significantly in their familiarity with ICT. Teachers who teach in public schools did not differ significantly in their familiarity with ICT than private school teachers. This is not a surprise since majority of the respondents reported that they do not have computers and also they are not computer users. The respondents' as a whole seemed generally familiar with Information and Communication Technologies (ICT). The frequency distribution showed that 62% of total teachers were familiar with Information and Communication Technologies.

CONCLUSION

Computing poses a lot of challenges to the education system in terms of its integration into the curricula of schools and the vast potential it holds for socioeconomic development. The increasing use of computers in industry places a very high demand on schools to provide opportunities for computer literacy. This in turn places a demand on teacher education to revise its curricula to provide quality teachers equipped for this purpose. As computer use continues to increase in society, educators must also prepare for the use of computers within the classroom. This involves all levels of education, including basic schools.

RECOMMENDATIONS

Considering the findings and conclusions drawn from the study, the following recommendations are made;

- 1. More attention should be paid to the initial teacher training programme in Ghana. The training colleges must be well equipped with ICT facilities so that they can train teachers with good knowledge in ICT for our basic schools.
- 2. There is the need for in-service training in computer technology because it will build their confidence so that they can become capable of dealing with available technology.
- 3. The Ministry of Education and Ghana Education Service should provide sufficient hardware and software for all basic schools. Computers and computer-related technologies should be part of classroom teaching activities in Ghana

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