

MULTIDIMENSIONAL BARRIERS TO INFORMATION AND COMMUNICATION TECHNOLOGY ADOPTION AMONG SENIOR HIGH SCHOOL TEACHERS IN GHANA

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Abstract

This study examined the barriers to the adoption of ICT in teaching among Senior High Schools teachers in the Sekyere South district in Ghana. The study employed a descriptive survey design to investigate 150 teachers who were randomly selected. A researcher - developed questionnaire was used as the main research instrument for the study. The analysis of results was done using SPSS. Results from the study showed that: age, gender of teachers, teaching experience, and educational qualification are major characteristics of teachers influencing their adoption of ICT in teaching. The results also indicated that, inadequate time, lack of in-service training on ICT usage for teachers, little knowledge about ICT before joining the teaching profession, inaccessibility of computers, and management's ignorance about teachers' use of ICT in classroom are the strong barriers to the adoption of ICT in teaching.

KEY WORDS: Information and communication technology, adoption, barriers, Ghana

1. INTRODUCTION

Information and Communication Technology (ICT) has become essential tool in today's information age, making a dramatic impact on the lives of people through education, research and development in the global perspective. Education is seen as the basis for developing innovation, science and technology to participate in the global knowledge economy. Studies revealed that, over the past decades there has been an ongoing push and crusade for teachers' integration of ICT into teaching pedagogy (Jedeskog, 2005). According to Tella et al (2007), this is because ICT can be used in kindling students' interest, enhancing recall of previous learning, providing new stimuli, activating the learner's response, and providing systematic and steady feedback.

Bordbar (2010) in a study concluded that, information technology is an essential part of a lifelong interest in learning in education and helps to accomplish task with minimum input. Correspondently, Lai et al (2004) admitted that, appropriate use of ICT can stimulate the development of higher cognitive skills, deepen learning as contribution to the acquisition of skills for all lifelong. Moreover, UNESCO (2008) found that, teachers' use of ICT plays a unique and complementary role in technological literacy, knowledge deepening, knowledge creation, teaching pedagogy, professional development, curriculum and assessment, and school organisation and administration. A study conducted by Tella et al (2007) found that, many governments in the developing countries around the world are committed to

computerize schools to enhance teaching and learning however, only few teachers have developed coherent strategies to integrate its use fully as a pedagogical tool in the classroom. For example, In Ghana, ICT education policy has been formulated since the year 2007 and the government has invested so much in the policy. This policy considers issues of ICT infrastructure; curriculum and content; training and capacity development; planning; procurement and administration. It also pays attention on the management, support, sustainability, and monitoring and evaluation. The policy states that ICT is to be taught as a subject, and integrated as a pedagogical tool for teaching and learning in other subject areas in primary and secondary schools.

Upon all the extensive investment in this policy, researchers such as Baeket *al*, (2008) concluded that, in Ghana investment in ICT education has increased heavily yet ICT usage in teaching and learning in the education sector is still low and even lagged behind the business sector significantly. It is worth noting that, even though the Government and other stakeholders in the educational sector in Ghana are pushing for teachers' use of ICT in teaching, it is still not clear why only few teachers in senior high schools use ICT as a pedagogical tool in teaching the various subjects. The reasons for the limited use of ICT as a pedagogical tool for teaching are also not well established through research especially in Ghana.

Motivated by this background, this current study investigates the characteristics of teachers who use ICT in teaching and the barriers to the teachers' adoption of ICT in teaching a case of Senior High School teachers in the Sekyere South Districts in Ghana. Some few existing previous studies such as Wickrema & Stacey (2007); Neyland (2011) and Muller (2008) investigated the barriers to the adoption of ICT in teaching but paid less attention to the characteristics of the teachers who use ICT in teaching. Meanwhile, characteristics of the teachers using ICT in their lesson delivery can have a significant impact on their attitude towards adoption of ICT. Unfortunately, the study did not concern itself with the specific characteristics of the teachers who adopt ICT in teaching especially in the senior high schools in Ghana. The uniqueness of this current study is such that, it investigates the barriers and the specific characteristics of the teachers who adopt ICT in a more multidimensional approach.

2.0 Brief Literature Review

This current study is based on the theory of Adoption and Diffusion of Innovations by Rogers (2003). Roger's Innovation Decision Process theory states that, an innovation adoption is the process that occurs over time through five stages: knowledge, persuasion, decision, implementation and confirmation. The decision process is shown in the organogram as: knowledge of an innovation → forming an attitude toward the innovation, → a decision to adopt or reject → implementation of the new idea, → confirmation of this decision (Rogers, 2003). Accordingly, studies about technology diffusion in education in most cases concentrated on the first three stages of the innovation decision process (Baeket *al*, 2008). Roger has five adopter categories namely: innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%), and laggards (16%). It is argued that innovation attributes such as relative advantage, compatibility, complexity, trialability and observability as perceived by individuals influence the rate of adoption (Rogers, 2003).

Previous existing studies contended that, teaching experience, timetable difficulties, gender, professional qualification, and age are the main barriers to teachers' adoption of ICT (Kay, 2006; Gorder, 2008). Lau and Sim (2008) who studied

a survey of 250 secondary school teachers in Malaysia found that more experienced teachers use ICT more than the less experienced teachers. By definition, teaching experience refers to the number of years a teacher teaches and the more the number of years the more the teaching experience and the less the years the less the experience (Hernandez-Ramos, 2005). Similarly, finding by Volman and Van-Vec (2001) indicated that, male teachers apply ICT in teaching more than their female counterparts. However, Adams (2002) in his study found that female teachers use ICT in teaching more frequently than male teachers. A corresponding research by Korte and Husing (2007) strongly argued that, age is a significant factor influencing teachers' adoption of ICT. The authors further concluded that old teachers use ICT in teaching more than the young teachers. This study builds upon these views and examines into details the barriers and specific characteristics of teachers who adopt ICT in teaching in a broader perspective.

3.0 METHODOLOGY

The study was conducted in the Sekeyere South District in the Ashanti region of Ghana. The District has five senior high schools namely KonaduYiadom Senior High School, Agona Adventist Senior High School, Agona Senior High and Technical School, Okomfo Anokye Senior High school and Adu Gyamfi Senior High School. These schools have a total student's population of about 12,500 with a total population of teacher of about 486. The target population for the study constituted teachers in the Senior High schools in the District. The study employed a multi stage sampling procedure to select the respondents for the study. In the first stage, the Sekeye South District was purposively selected since it is one of the Districts with the highest total number of Senior High Schools in Ghana. In the second stage, simple random sampling was used to select three senior high schools in the District. An iterated step was again taken where a total sample size of 150 respondents were randomly selected for the study. The study employed the formula developed by Yamane (1973) in calculating sample size. The formula is given as:

$$n = \frac{N}{1 + N(e)^2}$$

n =is the required sample size.

N =the population size

e=Tolerable error (which in this study was pegged at 0.05).

The summary of the sample characteristics is presented in Table 1.0. The study used researcher -developed questionnaires as the main instrument for data collection. A total of 150 questionnaires were administered to respondents to collect information for the study. The data analysis was done using descriptive (mean, frequencies, standard deviation and percentages) statistics with SPSS and the results were presented in tables.

4.0 RESULTS AND DISCUSSIONS

4.1. Characteristics of teachers who integrate ICT into their teaching

The study examined the characteristics such as age, educational qualification, gender, teaching experience of the teachers who adopt ICT into their teaching pedagogy. Out of 150 respondents who participated in the study, only 14.67% apply ICT in teaching while 85.33% do not integrate ICT into their teaching pedagogy. The discussion of the results is done below.

4.1.1. Age of Respondent and the Adoption of ICT

Table 2.0 presents the age distribution of teachers and their usage of ICT in a cross-tabulation. The results showed that, out of the 150 respondents who took part in the study, 48 aged 41-50 years representing 32%, 43 aged 31-40 years representing 28.7% while 39 aged below 31 years representing 26% and 20 respondents 13.3% were also within the age of 51-60 years. The results also showed that, teachers aged above 30-41 years representing 32% frequently integrate ICT into their lesson delivery more than those below the age of 30 years and those above 41 years. However, teachers aged below 30 years apply ICT more frequently than teachers aged above 41 years. Intuitively, teachers who integrate ICT into teaching were predominantly within the age of 31-40 years. This implies that, as teacher's age increases his or her interest to apply ICT also increases but beyond the age of 41 years, the frequency of their usage of ICT drops (see Table 2). These findings agree with that of Korte and Husing (2007) who revealed that there is a relationship between teacher's age and their computer attitudes and concluded that old teachers appear to integrate ICT into their teaching more than the young teachers.

4.1.2. Gender of Respondents and Adoption of ICT

The results from Table 3 reveal that, the use of ICT in classroom teaching was predominantly among the male teachers. Even though, comparatively, male teachers were found to be more ICT friendly, only 19 teachers representing 17%, integrate ICT in their teaching delivery while 92 male teachers do not integrate ICT in teaching representing 83%. Correspondently, only three female teachers were identified to be using ICT in teaching which represents 7.7% of the total females who participated in the study. This finding is consistent with that of Volman *et al.*, (2001) who found that female teachers have low levels of computer usage due to their limited technology access, skill, and interest.

4.1.3 Educational Qualification of Respondents and Adoption of ICT

Table 4 shows that, about 64% of the teachers who took part in the study have obtained bachelor's degree as their highest educational qualification while 36% have their master's degree as their highest level of educational qualification. This implies that the minimum educational qualification among the senior high school teachers in the district is the first degree. The results further show that, 18 teachers representing 18.7% of the total number of teachers with first degree as their highest educational qualification apply ICT in teaching while 7.4% of the teachers with master's degree use ICT in their teaching. Intuitively, the results suggest that teachers with first degree use ICT more than those with master's degree as their highest educational qualification. It is possible that, teachers with Master's degree did not have the opportunity to learn ICT during their training to become teachers.

4.1.4 Teaching Experience of Respondents and Adoption of ICT

The results from Table 5 show that, about 106 teachers have more than five years teaching experience while 44 teachers have 1-5 years' experience in teaching. The study also found that, only six teachers have less than one year teaching experience. This implies that teachers who have more than five years teaching experience adopt ICT in their teaching more than those with 0-5 years teaching experience. The possible reason adduced for this is that, those teachers who have more than five years teaching experience are those who have attended educational workshops, seminars, training

and conferences on how ICT is integrated into teaching. In same vein, those teachers with 0-5 years teaching experience are those who need more years to familiarize themselves with classroom management, time management, teaching curriculum before they integrate the ICT in their teaching pedagogy. This finding further suggests that, highly skilled new teachers focus could be on how to use ICT instead of how to incorporate ICT in their teaching. This finding is also in line with that of Lau and Sim (2008) who findings revealed that more experienced teachers frequently use computer technology in the classrooms more than the less experienced teachers.

4.2. Barriers to the use of ICT in Teaching

During the study, respondents were asked to indicate what they perceived as the barriers militating against their adoption of ICT in teaching in their schools. These barriers were coded using SPSS where any barrier that respondents perceived to be applicable was dummied as 1 while that not applicable was dummied as 2 and their means and standard deviation were presented in Table 6 for further discussion. Results from the table shows that, the strong and major applicable barriers militating the use of ICT in teaching according to the respondents are: inadequate time to use ICT in class (mean =1.13) ,lack of training in computing for teachers as in-service training (mean = 1.11), little previous knowledge about ICT before joining the teaching profession (mean=1.17), inaccessibility of computers in the schools (mean =1.18) and management's ignorance about teachers' usage of ICT in classroom(mean=1.13).

The findings give a picture that teachers have limited time to integrate ICT into their teaching pedagogy.. It shows that, teachers' teaching time tables and the restricted curriculum do not make any provision for such tool as ICT to be comfortably integrated into their teaching. This finding agrees with that of Baeket *al*, (2008) who found that time table structure prevents teachers from adopting ICT in teaching. They therefore suggested that, incorporating ICT across curriculum requires careful timetabling and corporation among departments. The respondents also agree that, lack of in-service training in computing and ICT use in teaching prevent teachers from adopting ICT as their pedagogical tools. Some teachers accepted that, they were not exposed to ICT use in teaching during their pre- service training to become teachers from their educational institutions. It was also found that, teachers little previous knowledge in computing was a key barrier that avert teachers from adopting ICT in teaching. Respondents indicated that, they received less training in computing in school and cannot fully complement their ability to integrate ICT into teaching.

Again, accessibility of computers in the schools was also found to be among the barriers militating teachers' use of ICT in teaching. The study also identified that, all the three senior high schools have computer laboratories but the computers available were not enough to serve both teachers and students. More importantly, respondents attributed the inability of the teachers to adopt ICT in teaching to the attitude of the management of the schools and the educational setup. Respondents indicated that the management does not care whether they use ICT in teaching or not. They believe that, if their superiors become much concerned about the use of ICT in teaching it would also encourage them to learn how to integrate ICT in teaching.

5.0 Conclusions and recommendations

The study examined the characteristics of teachers who adopt ICT in teaching and barriers militating against their adoption. The results indicated that characteristics of teachers such as age, gender, teaching experience, educational

qualification influence their adoption of ICT in teaching. Moreover, factors such as inadequate time to use ICT in class, lack of training in computer for teachers as in-service training, little previous knowledge about ICT before joining the teaching profession, inaccessibility of computers in the schools and management ignorant about teachers' adoption of ICT in classroom are the key barriers to their adoption of ICT in teaching. The study recommends that, educational policy makers, heads of senior high schools and other tertiary institutions in charge of professional teacher certification ensure that ICT is strongly used as a pedagogical tool in their lesson delivery. The study also recommends that frequent in – service training on the use of ICT in teaching be organized for teachers to keep them updated on the ICT usage in teaching various subjects in the senior high schools

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Table 1.Summary of the Sample Characteristics

School	Population Size	Sample	Female	Male
KonaduYiadam SHS	66	43	13	32
Agon Sec. Tech/SHS	79	52	17	38
OkomfoAnoky SHS	95	55	19	41
Total	240	150	39	111

Table 2: Age distribution of teachers and Adoption of ICT in teaching (cross tabulation)

Age (years) /Response	Yes	No	Total
below 31	6(15.4%)	33(84.6%)	39(26%)
31-40	7(16.3%)	36(83.7)	43(28.7%)
41-50	6(12.5%)	42(87.5)	48(32%)
51-60	3(15%)	17(85%)	20(13.3%)
Total	22	128	150

Table 3: Gender of teachers and adoption of ICT in teaching (cross tabulation)

Gender /Response	Yes	No	Total
Male	19(17.1%)	92 (82.9%)	111
Female	3(7.7%)	36(92.3%)	39
Total	22	128	150

Table 4 Educational Qualification of Teachers and ICT adoption (cross tabulation)

Qualification	Yes	No	Total
First degree	18(18.7%)	78(81.3%)	96
Masters' Degree	4(7.4%)	50(92.6%)	54
Total	22(14.7%)	128	150

Table 5: Teaching experience and adoption of ICT in teaching

Teaching Experience/Response	Yes	No	Total
Less than year	0	6	6
1-5 years	6	32	38
6-10 years	9	52	61
11-15 years	6	39	36
Above 15 years	1	8	9
Total	22	128	150

Table 6: Barriers to adoption of ICT in teaching

Barriers	Mean	Std. Deviation	N
Inadequate time to use computer in Class	1.13	0.33	150
Lack of confidence in using ICT to teach	1.55	0.50	150
Fear	1.63	0.49	150
Lack of training in computing	1.11	0.31	150
Teachers' age	1.93	0.26	150
Little previous knowledge in computer	1.17	0.38	150
Not sure of the usefulness of computer	1.98	0.14	150
Computer not accessible	1.18	0.39	150
Management do not care whether I use ICT	1.13	0.34	150
Computer not reliable	1.81	0.39	150