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MAKING INFORMATION AND COMMUNICATION TECHNOLOGY AS A PROGRAM IN SENIOR HIGH SCHOOL CURRICULUM: TEACHERS' CONCERNS

Research article

Dr. Philip Siaw Kissi (https://orcid.org/0000-0002-9862-9055).
University of Education, Winneba
Department of Management Sciences
philip.asakomah@yahoo.com

Daniel Opoku (https://orcid.org/0000-0003-4558-4241).
University of Education, Winneba
Department of Management Sciences
Ideas4danny@gmail.com

Samuel Ebenezer Armah
University of Education, Winneba
Institute for Distance and e-learning
searmah@gmail.com

Correspondence: Dr. Philip Siaw Kissi, University of Education, Winneba, Department of Management Sciences, P. O. Box 25, Winneba, Ghana. philip.asakomah@yahoo.com

Philip Siaw KISSI (PhD) is a lecturer in the Departments of Management Sciences at the University of Education, Winneba (UEW). A former lecturer in the MIS department at Cyprus International University, Turkey. He is currently teaching MIS and ICT at UEW

Daniel Opoku is a young technology lecturer in the Departments of Management Sciences at the University of Education, Winneba (UEW), School of Business. He has some research publications in the field of information systems.

Samuel Ebenezer Armah, MPhil., Chief Administrative Assistant in charge of Institute for Distance and e-learning (IDeL) students' records at the University of Education, Winneba. He is also ICT Part-Time Lecturer at IDeL of the University of Education, Winneba

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Philip Siaw Kissi

philip.asakomah@yahoo.com

Daniel Opoku

Ideas4danny@gmail.com

Samuel Ebenezer Armah

searmah@gmail.com

Abstract

Information and Communication Technology (ICT) education is considered as a subject not a program in Ghanaian Senior High Schools (SHS) curriculum. However, the performance of students offering ICT related programs in Higher Education is abysmal. Therefore, this study investigated the teachers concerns about making ICT as a program in Ghanaian Senior High School (SHS) Curriculum. 320 teachers in SHSs in Ghana were used for the study. The study employed a cross-sectional survey approach to investigate the concerns of the teachers. Descriptive statistics and independent sample t-test and Analysis of Variance (ANOVA) test were conducted on the responded survey data. The ICT teachers reported that ICT knowledge is relevant for students in SHS (mean = 3.909, SD = 1.093), the students would have several job opportunities (mean = 3.888, SD = 1.215), and should be made a program in the SHS curriculum in Ghana (mean = 3.963, SD = 1.105). Also, there was is a statistically significant difference ($t(318) = -1.022$, $p = 0.00 < 0.05$) between the concerns of female and male teachers on concerns of making ICT as a course in SHS curriculum. Additionally, perceived relevant knowledge of ICT and job opportunity would significantly, $F = 138.634$ and $p = 0.000(< 0.05)$ influence the making ICT as a program in SHS curriculum. The findings draw implications for the Ministry of Education and SHS curriculum planners in updating curriculum to prepare SHS students with the essential ICT knowledge and skills higher education and future employment.

Keywords: ICT, Curriculum, Teachers, Senior High School, Ghana

1. Introduction

Today's society is extremely dependent on Information and Communication Technology (ICT). Experts and professionals of ICT are needed to develop technologies for economic development and industrial espionage as well as cybercrimes (Erumban & Das, 2020; Kılıçaslan & Töngür, 2019; Thomson, Veall, & Sweetman, 2018). There is a great need for ICT knowledge and skills in the medical technology and automotive industry. This makes ICT a "major tool for building knowledge societies" (UNESCO 2003, p.1). As a result, many High Schools in countries such as Germany, Russia, Portugal, Turkey, Czech Republic, Austria and Greece follow ICDL curriculum for their ICT Program, not a course as is done in Ghana. Up to the present time, more than 16,000,000 people have enrolled on the ICDL curriculum, and thousands of high schools have adopted ICDL to improve and certify students' digital skills

(ICDL, 2019). Consequently, students from High Schools are to offer ICT related programs in the universities

However, the situation is different in Ghana. ICT is taught as a subject, not a program and students offering General science at SHS level with limited knowledge of ICT are allowed to enrol on ICT related programs in the university. Moreover, the ICT subject taught in SHS is not directly related to those ICT programs such as BSc. in computer science, Information technology, computer engineering and others offered in the Ghanaian university. As a result, the performance of students offering computer programs in Higher Education is appalling. This may due to the limited ICT knowledge and skills that are acquired from the SHS curriculum. Therefore, knowing the views of ICT teachers concerning ICT curriculum is important.

The study aimed to examine teachers' concerns about marking ICT as a program in the SHS curriculum in Ghana. This study sought to:

1. Examine the level of teachers' concerns about the relevance of ICT knowledge and its job opportunity
2. Investigate teachers' concerns about marking ICT as a program in the SHS curriculum?
3. Determine whether gender difference affects the concern on marking ICT as a program in the SHS curriculum.
4. Find out the extent to which teachers perceived personal knowledge and job opportunity relate to making ICT as a program in the SHS curriculum.

The following research questions guided the study:

1. What is the level of teachers' concerns with regards to the relevance of ICT knowledge and its job opportunity?
2. What are teachers' concerns about marking ICT as a program in the SHS curriculum?
3. What is the difference between the male and female teachers' concern on marking ICT as a program in the SHS curriculum?
4. To what extent do teachers' perceived relevant knowledge and job opportunity relate to making ICT as a program in the SHS curriculum?

Null Hypotheses were formulated:

H1: There is no significant gender difference between the male and female teachers' concern on marking ICT as a program in the SHS curriculum?

H2: Relevant of ICT knowledge and job opportunity does not relate individually to perceive making ICT as a program in SHS curriculum.

2. Literature Review

Most research studies have seen the importance of how ICT has improved the educational institutions by helping teachers with effective teaching and learning environment (Agyei & Voogt, 2011; Kissi & Osafo, 2019; Kolikant, 2012; Kubrický & Částková, 2015; Olaore, 2014; Raja & Nagasubramani, 2018; Umar & Hassan, 2015; Vanderlinde & van Braak, 2011; Vitanova et al., 2015). Inculcating ICT into the academic curriculum would not only help the students to understand and use ICT but also serve as a learning tool for teachers. Since academic teachers play an important role in implementing innovations and curriculum change, their perception, knowledge and ICT usage will strongly influence this process (Kissi, Nat & Idowu, 2020; Vanderlinde & van Braak, 2011). Teachers concerns to inculcating ICT program in the SHSs is very imperative. Although there are some studies investigating teachers and

students usage of ICT as a subject in schools (Raja & Nagasubramani, 2018; Hatlevik, 2017), it seems studies have not given attention to exploring ICT as a program in developing country context like Ghana. For instance, Hatlevik (2017) conducted a study using 332 sample size of teachers to investigate the relationship between teachers self-efficacy, their digital competence towards to use of ICT at school. The study revealed that teachers who have adequate online experience towards using ICT can inculcate such experience in their classroom. The author studies saw ICT as a tool that could be used to enhance teaching. In a related study by Hatlevik and Arnseth (2012), the authors concluded that teachers with higher rates of ICT supportive leaders experience a higher degree of computer usefulness, perceived learning outcomes for students and higher computer usage compared with teachers who report fewer rates of ICT supportive leaders. The authors' words compelled that teachers with adequate experience of the use of ICT (softwares, hardwares etc.) are more likely to use it in the classroom as compared to teachers with little knowledge or experience.

Furthermore, Kolikant (2012) found out in his study that students were less passionate about the integration of ICT into their academic curriculum. According to the study findings, the usage of ICT was teacher-centred; and students didn't have the chance to explore its usage. Opoku, Pobee and Okyireh (2020) witnessed the same phenomenon in a study and recommended that the usage of technology should be centred on both the instructors and the learners to create an effective learning environment. Vanderlinde and van Braak (2011) also examined a study on a new ICT curriculum for primary education. The authors' study found teachers to have a moderate opinion about the new ICT curriculum and that both teacher and school level conditions explain teachers' perceived characteristics of the new ICT curriculum. According to Wikan and Molster (2011), some teachers express a lack of ICT confidence even though they have been taking part in ICT courses. They believe that taking just a course in ICT is not going to benefit the students than reading an ICT program (Nkomo, Nat & Kissi, 2019; Opoku, Pobee and Okyireh, 2020). Çapuk (2015) offers a useful analogy that ICT seen as a subject matter should be integrated into other subject areas such as mathematics, Science, Literacy, and other related subjects that see ICT as relevant. It is realized from the above literature that most concerns have been given to ICT as a subject matter but not necessarily as a program. Also, the subject of ICT taught in SHS is not specifically related to certain ICT programs like BSc. In computer science, IT, network engineering and others offered at Ghanaian university. As a result, the performance of students in higher education providing computer programs is appalling. It may be due to the limited knowledge and competencies in ICT gained from the SHS curriculum. Therefore it is important to know the views of ICT teachers on making ICT as a program in the academic curriculum.

3. Methodology

The study employed a cross-sectional survey with quantitative data collection approach. Thus, gathering of information from a sample taken from a population. It is widely in the education, social science, business and other disciplines which provide speedy, low-priced and accurate means of finding information from a large group of people (Bordens & Abbott, 2002; Mitchell & Jolley, 2012). Target population consist of all ICT teachers at the SHS level. The target population refer to the population that the researcher would ideally like to generalized (Baran, 2020; Myers, Well & Lorch, 2010). Ghana has sixteen regions divided into 216 local districts. There are 872 SHSs in Ghana. However, 32 SHS two from each region were conveniently selected as accessible population. Purposive sampling technique was employed to select 320 ICT teachers in SHSs for the study.

4. Result and findings

Out of the 320 teachers, 50.6% (162) of them were males whilst remaining, 49.4 % (158) were female. The male teachers involved in the study were a little higher than their female colleagues because there was a relatively fewer number of female SHS teachers in Ghana. Further, 20 ICT teachers were selected from each region of Ghana. 93.75% (300) of them were ICT public SHS teachers and the remaining 6.25% (20) in private SHS. Detailed information is presented in Table 3.

Table 3. Distribution of Participants

Variable	Frequency	Percentage
Gender		
Female	162	50.6
Male	158	49.4
ICT Teachers		
Public SHS	300	93.75
Private SHS	20	6.25

The internal consistency of the three variables was checked. As per Hair et al. (2010), the generally accepted value for reliability test using the Cronbach's alpha (α) should be more or equal to 0.70. All the constructs provided a high-reliability rating with Cronbach's alpha (α) values ranging from 0.871 to 0.924, as seen in Table 4. Also, the skewness and kurtosis indices were evaluated to determine the normality of the data. The skewness and kurtosis indices should not be higher than the magnitude of 2.3 or |2.3| to maintain the normality of the data (Lei & Lomax, 2005). However, the skewness index and the kurtosis index for all items fall into the appropriate range. The data in this study is deemed to be suitable for further analysis. Table 4 presents the constructs reliability and descriptive statistics. From the Table 4, the mean of the constructs, Relevant of ICT knowledge (mean = 3.909, SD = 1.093), Job Opportunity (mean = 3.888, SD = 1.215), and Making ICT a program (mean = 3.964, SD = 1.105) were found to be above 3. This suggested that the teachers agree that ICT is relevant knowledge, there is a lot of job opportunity and ICT is important in making it a program in SHS curriculum.

Table 4: Results of reliability analysis and descriptive statistics

Items	N	Mean	SD	Skewness	Kurtosis	Cronbach Alpha
1. Relevant of ICT knowledge	320	3.909	1.093	-1.598	1.603	0.871
2. Job Opportunity	320	3.888	1.215	-1.459	0.868	0.896
3. Making ICT a program	320	3.964	1.105	-1.710	1.168	0.924

Research Question 1: What is the level of teachers' concerns with regards to the relevance of ICT knowledge and its job opportunity?

In research question 1, descriptive statistics were employed to find out mean scores, frequencies, standard deviations, and percentages for the analysis. "strongly disagree" and "disagree" were considered as "disagree" while "strongly agree" and "agree" were regarded as "agree" in the analysis.

Table 5. The relevance of ICT knowledge and Job opportunity

Items	D n (%)	N n (%)	A n (%)	M	SD
1. ICT knowledge is an exciting and relevant area	40 (12.6%)	16 (5.0%)	264 (82.5%)	3.96	1.221
2. ICT knowledge is interesting and important for SHS students Job Opportunity	41 (12.8%)	41 (12.8%)	249 (77.8%)	3.86	1.099
3. There are plenty of Job opportunities existing in the field of ICT	51 (16.0%)	7 (2.3%)	155 (79.7%)	3.90	1.327
4. ICT is a fast-growing field and applied in several organisation and industries	49 (15.3%)	20 (6.3%)	151 (78.4%)	3.88	1.224

Note: D = Disagree, N = Neutral, A = Agree, M = Mean, and SD = Standard deviation

As reported in Table 5, the high number of the ICT teachers 264 (82.5%) stated that ICT is an exciting and relevant program (item 1), only 40 (12.6%) disagree. Besides, 249 (77.8%) of them expressed that the ICT program would be an interesting and important program in SHS curriculum (item 2). Also, the mean scores range from 3.96 (1.221) to 3.86 (1.099). This suggested that all the items are agreed by the ICT teachers. The finding indicates that ICT program is an exciting and relevant area. They supported that ICT knowledge is interesting and important for SHS students. Furthermore, most of the ICT teachers 155 (79.7%) agreed that there are plenty of Job opportunities existing in the field of ICT, only 51 (16.0%) of them disagreed (item 3). Moreover, majority of the teachers 151 (78.4%) accepted that ICT is a fast-growing field and applied in several organisation and industries, Few, 49 (15.3%) of the teachers disagreed (item 4). Also, the mean score ranges from 3.88 (SD = 1.224) to 3.90 (SD = 1.327). This result indicated that the teachers identify ICT as a fast-growing area creating more job opportunity for ICT professionals.

Research Question 2: What are teachers' concerns about marking ICT as a program in the SHS curriculum?

Research question two sought to determine the ICT teachers concerns about marking ICT as a program in the SHS curriculum. The minimum and maximum frequencies of the teachers' responses to the questionnaire survey items in Table 6 were 7 and 170 respectively and the mean scores ranged from 3.90 (SD = 1.162) to 4.00 (SD = 1.267). the highest number of the teachers 170 (84.4%) agree that SHS curriculum containing ICT program will add value to students' future education while 43 (13.4%) of the teachers disagreed (item 5). Furthermore, the majority of the teachers 161 (81.6%) agree that ICT program specialisation in SHS is

important. While 42 (13.2%) disagreed (item 6). Also, most teachers 157 (80.2%) reported that students are ready and interested to enrol in ICT program in SHS (Item 7), only 43 (13.5%) shown disliked.

Table 6. Marking the ICT program in SHS curriculum

Items	D n(%)	N n (%)	A n (%)	M	SD
5. SHS curriculum containing ICT program will add value to students future education	43 (13.4%)	7 (2.2%)	170 (84.4%)	4.00	1.267
6. ICT program specialisation in SHS is important	42 (13.2%)	17 (5.3%)	161 (81.6%)	3.99	1.124
7. Students are ready and interested to enrol in ICT program in SHS	43 (13.5%)	20 (6.3%)	157 (80.2%)	3.90	1.162

Note: D = Disagree, N = Neutral, A = Agree, M = Mean, and SD = Standard deviation

Research Question 3. What is the difference between the male and female teachers' concern on marking ICT as a program in the SHS curriculum?

The question sought to find out whether gender affects the concern of making ICT as a course in the senior high school curriculum. Independent sample T-test was conducted to find out whether there was a significant difference between the male and female teachers' concerns about making ICT as a course in the SHS curriculum. A null hypothesis was stated and tested.

Testing of Hypothesis. H1: There is no significant gender difference between the male and female teachers' concern on marking ICT as a program in the SHS curriculum? The independent sample T-test was used to test the hypothesis at a $p = 0.05$. The results are provided in Table 7.

Table 7. T-test results on gender effect on teachers concern about ICT as a course in SHS curriculum

Gender	N	Mean	Standard deviation	T	DF	Significant
1. Male	162	3.901	1.1967	-1.022	318	0.009*
2. Female	158	4.028				

*$p > 0.05$

The overall mean scores of male and female teachers' concerns on making ICT as a course in the SHS curriculum were 3.901 (SD = 1.197) and 4.028 (SD = 1.001) respectively (Table 7). This appears to show that the female teachers had more positive concerns about concerns of making ICT as a course in the SHS curriculum than the male colleagues. The independent T-test results, however, supported that there was is a statistically significant difference ($t(318) = -1.022$, $p = 0.00 < 0.05$) between the concerns of female and male teachers on concerns of

making ICT as a course in SHS curriculum. Thus the null hypothesis was rejected. This means that though both male and teachers supported the idea of making ICT as a course in the SHS curriculum is significant. However, the female teachers are more positive about making ICT as a course in the SHS curriculum.

Research Question 4: To what extent do teachers' perceived relevant knowledge and job opportunity relate to making ICT as a program in the SHS curriculum?

The question required to discover the extent for which ICT teachers' perceived relevance of ICT knowledge and perceived job opportunity relate to their concern of making ICT as a course in the SHS curriculum. Analysis of variance (ANOVA) test was conducted to find out the relationship of a linear combination of perceived relevance of ICT knowledge and job opportunity related with perceived of making ICT as a course in the SHS curriculum.

Testing of Hypothesis. H2: Relevant of ICT knowledge and job opportunity does not relate individually to perceive making ICT as a program in SHS curriculum. Table 8 displays the ANOVA test of the statistical significance of the regression model. From Table 8, F = 138.634 and p = .000(< 0.05) which suggested that the test was statistically significant. Hence, the null hypothesis (H2) is rejected. This reveals that perceived relevant knowledge of ICT and Job opportunity significantly relates to making ICT as a course in the SHS curriculum. Therefore, relevant knowledge of ICT and Job opportunity are two main important factors that influence the making of ICT as a program in the SHS curriculum.

Table 8: ANOVA of Regression Significance

Model	Sum of Squares	Df	Mean Square	F	Sig.
1. Regression	40.685	2	20.342	138.634	.000a
Residual	311.115	317	.98		
Total	351.800	319			

a. Predictors: Relevance of ICT knowledge and Job opportunity

b. Dependent Variable: Making of ICT as a program in SHS curriculum

The standard regression model summary in Table 9 reports that the value of the multiple correlations (R = 0.340). This show how well all independent factors (Relevance of ICT knowledge and Job opportunity) combined related to the dependent factor (Making of ICT as a program in SHS curriculum). Moreover, the Adjusted R2 = 0.110 which suggests that all the factors combine contributed 11.0% of the variances in the dependent factor Making of ICT as a program in SHS curriculum.

Table 9: Standard Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig.F Change	
1	0.340a	0.116	0.110	0.991	0.116	20.727	2	317	0.000	1.988

a. Predictors: Relevance of ICT knowledge and Job opportunity
b. Dependent Variable: Making of ICT as a program in SHS curriculum

From Table 4.14, Relevance of ICT knowledge (β = 0.243, t = 4.213; p = 0.000 < 0.05) and Job opportunity (β = 0.158, t = 2.741; p = 0.006 < 0.05) factors were individually statistically significant relate to the Making of ICT as a program in SHS curriculum. Additionally, relevant of ICT knowledge (β = 0.243) was found to be the greatest reason why ICT should be made a program in SHS curriculum.

9: Regression Coefficient of the Standard Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	0.593	0.235		11.035	0.00*
	The relevance of ICT knowledge	0.211	0.050	0.243	4.213	0.000
	Job opportunity	0.510	0.055	0.158	2.741	0.006

Dependent Variable: Making of ICT as a program in SHS curriculum

5. Discussions and Conclusion

The study aimed to examine teachers' concerns about marking ICT as a program in the SHS curriculum in Ghana. The study revealed that ICT knowledge is relevant knowledge (β = 0.243, t = 4.213; p = 0.000 < 0.05). These findings are consistent with the study conducted by Gudmundsdottir, et al. (2020) when they concluded that student teachers' perceived ICT as important in the school curriculum. In addition, the findings show that there is several Job opportunity (β = 0.158, t = 2.741; p = 0.006 < 0.05) of learning ICT. In support, Younus and Sajjad (2020) suggested several job markets need some ICT skills employability. Furthermore, the study reported that ICT is relevant and should be made a program in SHS curriculum. Therefore, Ghana Education Service and curriculum planners should redesign SHS curricula by making ICT a program with required contents to equip the SHS students in line with the needs of the job market, particularly in Ghana.

6. Recommendation and Limitation

Based on the findings of the study, it is recommended that ICT should be integrated into the SHS curriculum as a program to improve the performance of students in ICT skills to meet the job market. Moreover, in-service training, seminars, workshops and short-term courses for teachers to improve their ICT skills to meet the demand for the implementation of the ICT program.

A similar study should be considered with a large sample size in more SHSs in the country. to provide a comprehensive picture of teachers' perception of ICT as a program in SHS curriculum. Besides, a similar study could be conducted to find out how SHS students perception of making ICT as a program in SHS.

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