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Obstruction of Using Information and Communication Technology (ICT) among Girl Students in Ghanaian Public Senior High Schools

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Abstract
This study examined the difficulties that girl students face in the use of ICT. An attempt was made to identify whether gender stereotype also affect girl students in the use of ICT. Descriptive survey design was used for the study. The research was carried out in five public Girls Senior High Schools in Ashanti Region of Ghana. Simple random sampling technique was used to select five hundred subjects for the study. Two hypotheses were formulated and tested using one-way anova and post-hoc test. The study showed that there was a statistically significant difference among Ghanaian girls Senior High Students in the factors they consider to be the major barriers to their use ICT. The study also established that there was a statistically significant difference among Ghanaian girls Senior High Students in terms of stereotype gender perceptions about their use of ICT. It is recommended that Senior High School administrators should encourage high levels of ICT usage among students especially girl students through continuous education and promotion of the benefits attached to ICT resources.
Keywords: ICT, difficulties, gender stereotype, Senior High School girl students

INTRODUCTION

Information and Communication Technology (ICT) is a prospective tool for extending educational opportunities, both formal and non-formal, to groups traditionally excluded from education due to cultural or social reasons. Typical examples are female, persons with disabilities, and the elderly as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus-based education. Many developed countries, including United States of America, the United Kingdom, Canada, France, Japan and Germany among others, have over the years, used ICT to transform their economies. ICT is so important that everybody, irrespective of sex, has to be competent in the use of these technologies.

While the benefits of ICT in transforming the society cannot be over emphasized, there are some potentially disturbing gender implications being put forward about the use and effect of ICT in education. Education in pre-independence Ghana was dominated by socio-cultural stereotypes. Boys were given special attention; they were encouraged to pursue science and technological disciplines in order to groom them for the labour market. On the other hand, girls were to be preserved for marriage and other domestic chores. This phenomenon has over the years created gender disparities in the educational system in relation to science and technology. The post-independence era has been generally characterized by growing gender sensitization and advocacy for girl-child education.

The government of Ghana has over the years, made fantastic effort in empowering girl students, encouraging them to pursue science and ICT education. The Science Technology, Mathematics Education (STME) clinic for girls was instituted in 1987 to promote the interest of girls in Science, Technology and Mathematics education and also, enable them to interact with women scientists and technologists. This and many other programmes were put in place to bridge the gender disparities in ICT education. However, available evidence points to the fact that the gender disparities still widens in the use of ICT in education.

The above situation in Ghana is not a peculiar case. The participation of girl in ICT has engaged the attention of many researchers. Matwyshy (2003), has stated that although in United States of America women use the internet in greater number than men, the number of women who are Information Technology professionals lag far behind that of men. He indicated that women comprise less than a quarter of Information Technology professionals. He further said, the percentage of women earning degrees in computer science has declined steadily since 1984 and the attrition rate among women computer science students is higher than men.

Given the critical role that ICT plays in development, it is argued that if women, who constitute about more than half of the human population, do not actively participate in this sector; nations will be limiting the impact that ICT could have on their economy. Over the years, there has been generally a record of low female representation and declining participation in Science and Technology. It has been observed that the numerous opportunities, offered by ICT adoption and utilization and the potentially instrumental role of ICT in development are gradually becoming reserved skills for men only. There is, therefore, generally a growing phenomenon of women losing interest in the use of ICT.

The existence of this phenomenon in education has been a topic of numerous discussions, conferences and

research papers. Numerous reasons have been offered for this persistent trend. These range from the more embracing issues such as the biased nature of "science" itself to more specific ones that deal with issues like the natural disposition of the various genders and their perception of ICT at various stages of development.

Statement of the Problem

Most experts agree that ICT skills are essential for ongoing success in today's workforce. Generally, however fewer girls are taking up computing at an advanced level, and universities are experiencing a continued lack of interest by female students in the use of ICT. This has been a cause for concern for many and consequently the topic of numerous discussions and research. Many researchers have conducted researches into several aspects of gender divide especially in the European countries. However, there were scanty researches into gender issues from the perspective of Africa.

This phenomenon poses a challenge to governments including Ghana. Having been fascinated by the global trend of persistently low and in some cases decreasing girls' use of ICT, it is important to probe this issue further. In particular, my interest lies in the difficulties posed by the use of ICT to Senior High girl students in Ghana

Purpose of the study

The main purpose of this study was to find out the factors that girl students perceive to be major barriers to the use of ICT.

Hypothesis

The following hypotheses have been formulated and tested.

1. Ho: There is no statistically significant difference based on institution in the factors that Ghanaian Senior High girl Students perceive to be major barriers to using ICT.
2. Ho: There is no statistically significant difference based on institution among Ghanaian Girls Senior High Students in terms of stereotype gender perceptions about the use of ICT.

Theoretical and Conceptual Framework

This study is primarily founded on Feminist Theory. There are many different streams of feminist actors who use the lens of gender and other analytical tools to explain women's subordination and oppression. Specific examples are theories of women's subordination and oppression as described by Meena (1992). Feminist actors use terminologies including subordination, oppression, inequalities in socialization, reproductive roles of women, patriarchy and other psychosocial terms to explain the root causes of disparities in access to computers by boys and girls. The common thread binding all the feminist actors is that they launch social struggles to end all forms of gender- based discrimination in training and access to education.

Girl participation in science and technology has been particularly low, specifically in ICT. This is a trend which has existed both in Africa and developed countries. Various factors influencing disparities in access to ICT include income levels, education, literacy and language. In addition, girls face additional circumstances commonly referred to as the 'gender digital divide'. Cottes (2003) expounded that much tenacious gender-structural inequalities inaugurate barriers to women's access, such as education, traditional cultural beliefs and practices and economic inequality. More often than not, it is the wider socio-economic and cultural context that accounts for persistent barriers to women's access to and use of ICT.

Berg (2002) in her research on gender and ICT in Norway claims that research carried out in the last 25 years in Norway has proved new technologies like computers and ICT have not meant sustained improvements in the situation of women. Rather the introduction of ICT has been seen as supporting the continuation of rather traditional gendered practices, since the new technologies are shaped and introduced into existing social patterns of differences between men and women.

In the African context, patriarchal control is reproduced at all levels in society and through institutional arrangement. Theories of patriarchy place the family at the center of gender relations (Chapman, 1993). It is to this extent that sons in society are trained and conditioned to take over this control and power function. Jirira (1998) argues that women as mothers are also socially conditioned, through socialization to prepare their male children for this future role, a role unfortunately that will eventually contribute to the subordination of their daughters.

Gender analysis shows that women are marginal users of ICT, 25% on average. (Toumbara Diawara 2002). At the professional level, for the girl child, it is not easy to pursue professional training. What women do is usually defined as something other than technology. There is a general assumption that women are essentially users as opposed to producers of information. Consequently, technological development is often tackled without the input of women though they may be involved with its use and may be affected by it.

There is a wealth of research on the male-dominated culture of computing. Among the commentators who have pointed out the negative effects of this culture on women are the Information Technology Association of America, the American Association of University Women, and the New York Times. (American Association of University Women Educational Foundation Commission on Technology). Elkjaer (1992), writing on ICT in Denmark, points out that masculinity, not femininity, is the problem when boys retreat into the computer to avoid human interactions and when they consider themselves the hosts in that environment, with girls as guests.

In relation to the aforementioned, several researchers have indicated that the violent language of technology may be invisible to males but can be a problem for females. Note hard disc, hard drive, reboot, cold boot, hits, permanent fatal error, and so forth. Recreational or even educational software for children often includes title words such as “attack” or “war.” (Buckley, 1988)

METHODOLOGY

Research design

The research design is basically descriptive survey in nature. This design was chosen because it has the advantage of producing a good amount of responses from a wide range of girl students in the public Senior High Schools of Ghana. Furthermore, descriptive studies provide a meaningful picture of events and seek to explain people’s perceptions and behaviour on the bases of the data collected. Descriptive survey design, however, is associated with some difficulties. In spite of the shortfalls of descriptive survey design, it is considered to be the most appropriate for carrying out this study.

Population

The target population of this study was the entire Senior High School girl students in the Ashanti of Ghana. However, the accessible population consists of girl students in five selected public Girls Senior High Schools in Ashanti of Ghana. In effect, five Girls Senior High Schools were purposively selected based on the interest of the researcher. The total accessible population of the girl students in the institutions selected stood at 13,217.

Sample and Sampling technique

In all, 500 Senior High School Girls respondents from the selected Girls Senior High School were randomly selected to participate in the study. In each of the Girls Senior High School, 25 to 35 girl students were randomly selected from each of the three forms totaling 100. The researcher selected 4 houses of residence in each of the Girls Senior High School using simple random sampling method.

Instrumentation

Structured questionnaire which was designed by the researcher was used to gather data. The questionnaire which was made up of 17 close-ended items was in two sections. The first section sought to illicit demographic data from the respondents. Section two was about factors girl students perceive to be major barriers in the use ICT and stereotypic gender perceptions girl students hold about the use of ICT.

Validity and Reliability

To ensure the validity of the research instruments, the questionnaire was reviewed by two experts in item construction. Their comments were used to delete items considered inappropriate. Furthermore, biased, unclear and deficient items were modified to reflect the research questions they were intended to answer. This exercise helped the researcher to establish content and construct as well as face validity. The reliability co-efficient using the Pearson Product Moment Correlation was found to be r =0.80

Data Collection Procedure

The respondents were contacted by first calling on the house Mistresses of the various Girls Senior High School. After seeking permission from them, the researcher went from dormitory to dormitory to administer the questionnaire personally to the girl students. The technique of administering the questionnaire personally was adopted because it afforded the researcher the opportunity to observe directly the respondents personal demeanor as they responded to the questionnaire. This enabled the researcher to explain, in detail, some of the items which were not understood by the respondents.

Data analysis

Data collected was represented in both descriptive and inferential manner. Descriptive statistics involved the use of frequencies, percentages tables and graphs to compute responses. Analysis of data was done through the use of the Statistical Package for Social Sciences (SPSS) software version 21.

RESULT OF THE STUDY

What factors do female students perceive to be major barriers to their use of ICT?

The choice of this question was to find out the major barriers that confront female students in their bid to use ICT. The responses to this question are shown in Table 1

Table 1: Ranking of major barriers inhibiting girl students use of ICT

Statement	Freq.	Percentages	Ranking
Inadequate female ICT lecturers	115	23.0	1
Less opportunities to learn ICT skills	100	22.0	2
Girl students are not given special attention	75	15.0	3
Lack of ICT role-models	75	15.0	4
Lecturers do not encourage student's use of the web	55	11.0	5
Cost of PCs is too high for girl students	50	10.0	6
Parents discriminate against girl students	20	4.0	7
Others	10	2.0	8

Source: Field Data, 2017

Table 1 depicts that on the whole, out of the total 500 respondents, 115 (23%) considered inadequate female ICT teachers as a major barrier. Furthermore, 110 (22%) stated that girl students have less opportunities to learn ICT skills. The analysis revealed further that 75 (15%) respondents indicated that girl students are not given special attention when it comes to ICT usage. Again, 75 (15%) considered lack of role-model as a barrier to ICT usage by girl students. 55 (11%) of the respondents also maintained that teachers do not encourage them to use ICT in their learning. To them, this was a barrier to their bid to use ICT. In the study, 50 (10%) respondents also indicated that the Cost of PCs is too high for girl students. of the respondents considered parents discriminating against girl students as a major barrier to female students.

Hypotheses 1

Ho: There is no statistically significant difference based on institution in the factors that Ghanaian Senior high girl students perceive to be major barriers to using ICT.

The assumption underlying this hypothesis was that Senior high girl students usually considered certain factors inhibiting their quest to use ICT. One way ANOVA was used to determine whether there are institutional differences in the perceived barriers to their usage of ICT. The result of the analysis is captured in Table 2.

Table 2: Institutional differences of perceived barriers to ICT usage

	ST MO n=100		ST MA n=100		YAA n=100		KG n=100		AGSH n=100			
Barriers to ICT usage	M	SD	M	SD	M	SD	M	SD	M	SD	F	P. Value
Perception of major barriers to using ICT	3.2	2.0	2.7	1.3	4.7	2.2	4.2	1.9	2.8	1.0	26.2	.000*

- P<0.05 alpha level

Table 2 shows statistically significant difference in the perceptions of the Senior High girl students across the entire five public Girls Senior High Schools in respect to the barriers to their usage of ICT, F (2, 495) = 26.237 P< .000

A post hoc test was done to determine the direction of difference among the institutions. The result is presented in Table 3

Table 3: Post Hoc Test on Multiple Comparisons of Perceptions of Major barriers to girl students' use of ICT
Tukey HSD

(I) Institution	(J) Institution	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
ST MONICA , A.Mampong	ST MA, Konogo	.500	.243	.241	-.17	1.17
	YAA,Kumasi	-1.450(*)	.243	.000	-2.12	-.78
	KG, Kumasi	-1.000(*)	.243	.000	-1.67	-.33
	AGSH, Ntonso	.450	.243	.346	-.22	1.12
ST MARY, Konogo	ST MO, Mampong	-.500	.243	.241	-1.17	.17
	YAA, Kumasi	-1.950(*)	.243	.000	-2.62	-1.28
	KG, kumasi	-1.500(*)	.243	.000	-2.17	-.83
	AGSH, Ntonso	-.050	.243	1.000	-.72	.62
YAA ASANTEWAA, Kumasi	ST MO, A.Mampong	1.450(*)	.243	.000	.78	2.12
	ST MA, Konogo	1.950(*)	.243	.000	1.28	2.62
	KG, kumasi	.450	.243	.346	-.22	1.12
	AGSH, Ntonso	1.900(*)	.243	.000	1.23	2.57
KUMASI GIRLS, kumasi	ST MO, A.Mampong	1.000(*)	.243	.000	.33	1.67
	ST MA, Konogo	1.500(*)	.243	.000	.83	2.17
	KG, kumasi	-.450	.243	.346	-1.12	.22
	AGSH, Ntonso	1.450(*)	.243	.000	.78	2.12
ADVENTIST GIRLS SH, Ntonso	ST MO, A.Mampong	-.450	.243	.346	-1.12	.22
	ST MA, Konogo	.050	.243	1.000	-.62	.72
	YAA, Kumasi	-1.900(*)	.243	.000	-2.57	-1.23
	KG, kumasi	-1.450(*)	.243	.000	-2.12	-.78

* The mean difference is significant at the .05 level.

It was observed that only 20 (4%) of the respondents considered parents discriminating against girl students as a major barrier to female students.

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* The mean difference is significant at the .05 level.

The direction of statistical difference, with regards to the major barriers to girls' inability to use ICT or enroll in ICT related programs, lies between ST MO, A. mampong It was observed that only 20 (4%) of the respondents considered parents discriminating against girl students as a major barrier to female students.

Hypotheses 1

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- P<0.05 alpha level

Table 2 shows statistically significant difference in the perceptions of the Senior High girl students across the entire five public Girls Senior High Schools in respect to the barriers to their usage of ICT, F (2, 495) = 26.237 P< .000

A post hoc test was done to determine the direction of difference among the institutions. The result is presented in Table 3

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	KG, kumasi	-1.450(*)	.243	.000	-2.12	-.78

* The mean difference is significant at the .05 level.

, YAA Kumasi, and KG, kumasi. In the same vein, difference is located between ST MA, konogo and YAA, kumasi. Furthermore, a difference was also observed between KG, Kumasi AGSH, Ntonso, and YAA, Kumasi.

The result of the analysis therefore rejects the null hypothesis that there is no statistically significant difference in the factors that Ghanaian Girls Senior High girl students perceive to be major barriers to their ability to use ICT.

Hypothesis 2

Ho: There is no statistically significant difference based on institution among Ghanaian Senior High girl Students in terms of stereotype gender perceptions about the use of ICT.

The essence of this hypothesis was to find out whether there is statistically significant difference in the gender stereotypic views expressed by the various girl students in the entire five public Senior High Schools regarding the use of ICT. In all, 9 statements were tested using one-way ANOVA which are captured in Table 4

Table 4: Gender-Stereotype Perception of ICT usage.

		ST MO n=100		ST MA n=100		YAA N=100		KG, n=100		AGSH n=100			
S/n	Stereotype Perception of ICT usage.	M	SD	M	SD	M	SD	M	SD	M	SD	F	P. Value
1.	ICTs are user-friendly.	2.4	0.6	2.3	1.4	2.1	0.6	1.2	0.5	2.3	1.0	4.4	.002*
2.	Parents encourage girl students to pursue ICTs.	2.4	0.6	2.4	0.9	2.1	0.7	2.3	0.8	2.8	0.8	9.9	.000*
3.	Girl students are interested in technology.	2.2	0.7	2.2	0.7	3.3	4.6	2.0	0.8	2.8	0.8	5.9	.000*
4.	Society encourages Girl students to enroll in ICT.	2.1	0.8	2.5	0.8	2.5	0.7	2.1	0.9	3.3	0.8	35.6	.000*
5.	ICT related programs are easy to learn.	2.8	0.8	2.5	0.7	2.7	0.9	2.6	1.0	3.3	1.0	12.1	.000*
6.	Computer related carriers are for men only.	3.1	1.2	2.5	1.1	3.3	1.0	3.3	1.1	3.3	1.0	12.0	.000*
7.	Girls can excel in ICT related education	2.5	1.2	2.8	1.2	2.0	1.0	1.6	1.1	2.6	1.1	16.9	.000*
8.	In terms of technology, Girls always depend on males	3.6	0.7	2.9	1.0	3.6	0.7	3.8	0.6	2.9	1.0	28.8	.000*
9	Girls are naturally nurtured for home management.	3.5	0.8	3.0	0.7	3.8	0.4	3.0	1.2	3.2	0.9	16.5	.000*

- P< 0.05 alpha level.

The data analysed in Table 4 shows differences in gender stereotypic responses in terms of ICT being user-friendly, F (2, 495) = 4.430, p<.002; parents encourage girl students to pursue ICT, F (2, 495) = 9.832, p<.000; girl students are interested in technology, F (2, 495) = 5.873, p<.000; and society encourages girl students to enroll in ICT, F (2, 495) = 35.582, p<.000. Similarly, differences were noted in the areas of ICT related programs are easy to learn, F (2, 495) = 12.054, p<.000; computer related carriers are for men only, F (2, 495) = 12.047, p<.000; girls can excel in ICT related education, F (2, 495) = 16.863, p<.000; girls always depend on males regarding the use of technology, F (2, 491) = 28.824, p<.000; and finally, girls are naturally nurtured for home management, F (2, 491) = 16.50, p<.000; were statistically significant.

To determine the direction of the differences, a Post Hoc Turkey test was conducted. Regarding the statement that girl students find computers and internet user friendly, the analysis revealed direction of differences between ST MO, Mampong and KG, Kumasi, ST MA, Konogo, AGSH, Ntonso as well as YAA,Kumasi and AGSH, Ntonso.

Similarly, the direction of difference on the issue of parents encouraging girl students to pursue ICT programs lies between AGSH, Ntonso and the other four schools. Again, with the statement that girl students are interested in technology, the direction of differences lies among ST MO Mampong, YAA Kumasi, ST MA Konogo and KG, Kumasi.

The direction of difference is located among all the schools understudied regarding the statement that society encourages girl to enroll in ICT programs. Another difference was noted between AGSH, Ntonso on one hand and all the four other schools understudied based on how girl students perceive ICT related programs as easy to learn. In a similar vein, with the statement of computer related carriers are for men only, direction of difference was observed between ST MO Mampong and the rest of the schools understudied.

With the statement that girls can excel in ICT related education, direction of difference was established among all the schools understudied. Considering the statement that girls must always depend on men when it comes to issues of technology, significant direction was established between ST MA, Konogo, on one hand, and YAA, Kumasi and KG, Kumasi on the other hand. Again, direction of difference was observed between AGSH, Ntonso on one hand and ST MO, Mampong, YAA, Kumasi and KG, Kumasi on the other hand.

Finally, on the statement that girls are naturally nurtured for home management a location of difference was established between ST MO, Konogo and the rest of the other four schools.

The result is that the null hypothesis which indicated that there is no statistically significant difference based on school among Ghanaian girl Senior High Schools in terms of stereotype gender perceptions about the use of ICT is rejected.

Discussion

The research revealed that girl students perceive certain factors to be major barriers inhibiting their ability to use

ICT. The major factors they enumerated were: lack of ICT role-models, inadequate female ICT lectures, less opportunities to learn ICT skills, and female students are not given special attention. These factors are well supported by the available literature. For example, female Computer Science students at Purdue reported in a survey that professors did not treat male and female students equally. (Wasburn & Miller, 2005). Several authors point out that it is the subtle, often unintentional, and individually trivial incidents of gender bias that are cumulatively powerful and have the effect of discouraging female participation in technology. (Gatta, 2001). Furthermore, Jepson & Perl, (2002) posits that lack of role models was the main reason why females are less likely to pursue technology careers.

About the stereotypic views of girl students, the findings revealed rather mixed reactions. This result corroborated the research findings of Shashaani, (1993). He found out that parents' computer stereotypes in favor of males encouraged their sons' computer involvement and discouraged their daughters'. Girls who believed their parents, perceived computers to be more appropriate for males, were in fact less interested in computers.

The result of the study revealed that many girl students considered ICT related programs as difficult to learn. The study of Volman & van Eck, (2001) also revealed that females tend to be less interested in computers, to have less positive views about the value of computing, and to report more computer nervousness and less confidence in their computer abilities. Cassidy & Eachus,(1997) further indicated that the gap in self-efficacy is fairly consistent from the elementary school through to university. Majority of the respondents disagree with the statement. This finding was inconsistent with the findings of Newman et al, (1995) According to Newman et al, (1995); many female students are likely to believe that working with computers is more typical for men. Johnson (2003) found out that computing continues to be closed to females if not by physical barrier, then by social misconception. According to Johnson (2003) Women in computing still perceive themselves as strangers in a strange world.

Conclusion.

Generally, Senior High Girls Students expressed positive attitude towards the use of ICT. However, there are a host of challenges facing them in using computers and the web. It was revealed that majority of them lack the necessary skills and confidence to use the ICT tools. It was abundantly clear that Senior High Girl students have gender based stereotype perception about their ability in the use of ICT.

Recommendation.

As a result of the findings made and conclusion drawn, the following recommendations deserve consideration.

1 The Senior High School administrators should maintain high levels of ICT usage among students especially girl students through continuous education and promotion of the benefits attached to ICT resources. This can be done through the use of seminars and training programmes as well as inviting female Information Technology (IT) personnel who would serve as role-models to the Senior High Girl students. This approach would help demystify some of the stereotypic views girl students hold about the use of ICT.

2. Academicians, course administrators and lecturers should pay more attention to gender differences regarding the use of ICT resources as a major component in classroom teaching.

3. Educational software should be constructed carefully so that stereotypes are avoided and to attract girl students. Educational software should be as gender neutral as possible. Software designers should consider the fact that girls tend to prefer "collaboration over competition" when it comes to educational tools.

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