Interest in ICT Studies and Careers: Perspectives of Senior High School Female Students in three districts in the Central Region of Ghana

Kofi Ayebi-Arthur

Department of Science and Mathematics Education, University of Cape Coast.

Published by: *Ghana Journal of Education and Teaching* No 12
Date published: 2011

ABSTRACT

The under-representation of females in Information and Communication Technology (ICT) fields of study and careers continues to attract considerable attention. This article discusses findings of a research that investigated interest in ICT studies and careers among female secondary school students from schools in three districts in the Central Region of Ghana. The article outlines the demographic background of the participating girls, their experiences with ICT, and their preferences for future studies and careers in ICT. Engineering was the least preferred career choice among female science students in co-educational schools whilst Computer Science/ICT and Nursing were the least preferred career choice among science students in female only schools. However, Medicine was the most preferred career choice among students of both types of schools.

Keywords: Computing self-efficacy, co-educational, educational disadvantage, female senior high school students, ICT study and career.

INTRODUCTION

The Information Technology – (IT) Industry in 1999 was characterised by a particular perception: "a career in Information Technology is often viewed as a masculine career. It is often associated with high level mathematical competence, individualistic working conditions, and low levels of social skills [(i.e.: the vision of the "geek" in the backroom

programming according to Gale as cited by Henwood, (1996: p.4)]. Henwood (1996) also said that majority of students reported not knowing what type of jobs young women would choose in the Information Technology Industry. Over half of the Year 11 and Year 12 students responded that they did not have enough knowledge of the industry to answer the questions regarding women and career change within the Information Technology Industry. The IT Industry needed to advertise the more interesting sides of IT; there are many other jobs that are more interesting. The range of positions include Project Managers, Systems Analysts, Internet Designers, Business Development Strategists, Marketing roles, and many more. Girls appeared to be generally poorly informed as to how technology is shaping the modern workplace and that skills previously regarded as the preserve of ICT specialists are now expected of workers in most organisational and occupational milieus. For example, students interested in career pathways such as science, medicine, hospitality, military and agriculture commented similarly that computer skills were not relevant to these careers.

In Australia, females continue to be largely under-represented in ICT courses (10% to 30%) and ICT-based careers (under 20%), and the low participation rates have not improved in the past decade [Miliszewska as (cited by Miliszewska, & Sztendur, (2010))]. Globally, the number of women enrolling in ICT courses in universities in western industrialised countries have also been spiralling down over the past two decades. Faulkner and Stewart (2003) surveyed the numbers of women studying in IT /computing courses between 1985 and 1990 in 19 countries and found that 12 countries – including the US and the UK – witnessed a decline during these years.

In 1987, only one out of 11 students in secondary schools in Ghana was a female. A figure that encouraged the Ghanaian government to inaugurate a programme specifically designed to push girls forward. That was the birth of the Science, Technology and Mathematics Education (STME) clinics, a new kind of summer school for girls. The 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. The first clinic which began as a national activity for 200 girls in 1987 nationwide was soon scaled up to sector, regional and district level programs with the view to increasing patronage and coverage. The clinics were decentralised to the district level in 1997 and has resulted in an increase in the number of girls pursuing science and technology related courses in senior secondary schools as well as the universities. According to Girls' Education Unit Basic Education Division (2001), the ratio of girls to boys taking science and maths is down to a level of about one to three. Today, more than 10,000 girls and boys all over the country are invited to these summer camps at the district level. The Government of Ghana has demonstrated its commitment to girls' education by creating in 1997 a special unit within the Basic Education Division devoted to girls' education. The Girls' Education Unit's (GEU's) objectives are to increase enrolment, retention, and achievement of girls, particularly in the sciences, technology, and mathematics through sensitization and special programs such as the annual Science Technology and Mathematics Education (STME) clinics. This good practice could be replicated at higher levels like the senior high schools and tertiary to reach gender parity at all these levels. ICT was not taught in the basic level of education and was taught as a subset of the Integrated Science subject in the senior high schools. However, educational reforms of 2007 introduced ICT studies in primary, junior high schools and senior high schools.

Objectives

This study sought to find out what programme of study female senior high science students want to pursue in the university and whether school stage decisions on a science-based career have any influence on the programme students pursue in the university.

The Research question and hypotheses that directed the study were as follows:

Research question

1. What programme of study do female senior high school science students want to pursue in the university?

Hypothesis

1. Educational level at which students decide on a science-based career has no influence on the programme students pursue in the university.
2. The type of school a female student attends does not significantly influence her choice of an ICT based programme.

METHOD

Population/sample selection

The population was all senior high schools in the central region of Ghana. The sample consisted of female science students in six senior high schools in the central region of Ghana. Three single sex senior high schools were purposively selected as they were the only existing female-only senior high schools in the central region at the time of the study. Simple random sampling using table of random numbers was used to select three co-educational senior high schools. Forty students in each school were selected to participate in the research. In total, 240 students constituted the sample. The ages of the students ranged from 15 to 20 years.

Instrumentation

A questionnaire named 'Female science students' choices in science and technology-based careers' was used to collect data from the sample. The questionnaire was divided into three sections. Section A elicited background information of the respondents while section B sought information on female students' motivation to pursue science and technology- based programmes using Likert-type questions. Section C involved using Likert-type questions to seek information on peoples' perception about female students in science technology–based career.

Data collection procedure

Permission was sought from the heads of schools and the questionnaires were given to class tutors who distributed the questionnaires to the female science students in the class. The return rate of the research instrument was 94.2%. The instruments were administered and retrieved by class tutors of the various classes.

Data analysis

The data collected was analyzed using frequency distribution, simple percentages, cross-tabulation and chi-square of the Statistical Package for Social Sciences (SPSS) version 13.

RESULTS

The results from this study are presented in three parts. The first part deals with the distribution of students' choice of programme, the second part deals with whether the stage when students decide on a science based career have any influence on the programme pursue in the university and the third part deals with hypothesis: the type of school attended does not significantly influence choosing ICT as a career by female science students.

Distribution of students' choice of programme

Table 1 presents the distribution of students' choice of programme. The results from Table 1 show that among females in co-educational schools, Medicine was the most preferred programme of choice with a frequency of 65 (59.1%). This was followed by Nursing with a frequency of 22 (20%), Computer Science/ICT with a frequency of 10 (9.1%) and Pharmacy had a frequency of 8 (7.3%). Engineering was the least preferred programme of choice with a frequency of 5 (4.5%). In the single sex school, the preferred choice of career to pursue was Medicine with a frequency of 79 (68.1%). This was followed by Engineering with a frequency of 14 (12.1%) and Pharmacy with a frequency of 11 (9.5%). Computer Science/ICT and Nursing both had a frequency of 6 (5.2%).

Table 1: Distribution of students' choice of programme

School type	Programme	Number	Percent
Co-educational	Engineering	5	4.5
	Medicine	65	59.1
	Pharmacy	8	7.3
	Computer Science/ICT	10	9.1
	Nursing	22	20.0
	Total	110	100.0
Single sex (Female)	Engineering	14	12.1
	Medicine	79	68.1
	Pharmacy	11	9.5
	Computer Science/ICT	6	5.2
	Nursing	6	5.2
	Total	116	100.0

Decision on a science based career

Table 2 shows the results of a cross-tabulation of when female science students in mixed sex school decide on a science-based career and what science-based programme they will like to pursue in the university. In the mixed sex schools, 57 students out of 110 decided in primary school to read a science-based programme. One student out of 110 decided to pursue an engineering programme, 39 students out of 110 decided to read Medicine, 2 students out of 110 decided to read Pharmacy, 5 students out of 110 decided to read Computer Science/ICT and 10 out of 110 students decided to read Nursing.

Forty one out of 110 students in the mixed sex schools decided in JHS to pursue science-based programmes in the university. Four students out of 110 decided to pursue an engineering programme, 20 students out of 110 decided to read Medicine, 5 students out of

110 decided to read Pharmacy, 3 students out of 110 decided to read Computer Science/ICT and 9 students out of 110 decided to pursue Nursing.

Twelve out of 110 students in the mixed sex schools decided in SHS to pursue science-based programmes in the university. No student decided to pursue an engineering programme, 6 students decided to read Medicine, 1 student decided to read Pharmacy, 2 students decided to read Computer Science/ICT and 3 students decided to pursue Nursing.

Table 2 A crosstabulation of level of education female science students in mixed sex school decide towards a science-based career and choice of programme

	Choice of programme					
Level of education	Engineering	Medicine	Pharmacy	Computer Science/ICT	Nursing	Total
Primary	1 (1.8%)	39 (68.4%)	2 (3.5%)	5 (8.8%)	10 (17.5%)	57 (100%)
JHS	4 (9.8%)	20 (48.8%)	5 (12.2%)	3 (7.3%)	9 (22.0%)	41 (100%)
SHS	0 (0%)	6 (50%)	1 (8.3%)	2 (16.7%)	3 (25.0%)	12 (100%)
Total	5	65	8	10	22	110 (100%)

P= 0.301, $\chi^2 = 9.517$, df = 8

Chi square test was used to establish if there was any relationship between the levels of education at which female students in mixed sex school made choices of programmes to pursue at the university. P obtained from the chi square was 0.301. The significance level at which the test was run was 0.05. As the P obtained was greater than 0.05 it means there is no significant relationship between the levels at which female students in mixed sex school choose the programme they will pursue in the university.

Table 3 shows the results of a cross-tabulation of when science students in female only school decide on a science-based career and what science-based programme they will like to pursue in the university. Fifty out of 116 students decided in primary school to read a science-based programme. Four students out of 116 decided to pursue an engineering programme, 40 students out of 116 decided to read Medicine, 5 students out of 116 decided

to read Pharmacy, and 1 student out of 116 decided to read Computer Science/ICT. No student decided to read Nursing.

Fifty four students out of 116 in the female only schools decided in JHS to pursue science-based programmes in the university. Six students out of 116 decided to pursue an engineering programme, 34 students out of 116 decided to read Medicine, 5 students out of 116 decided to read Pharmacy, 4 students out of 116 decided to read Computer Science/ICT and 5 students out of 116 decided to pursue Nursing.

Twelve students out of 116 in the female only school decided in SHS to pursue science-based programmes in the university. Four students out of 116 decided to pursue an engineering programme, 5 students out of 116 decided to read Medicine, 1 student out of 116 decided to read Pharmacy, 1 student out of 116 decided to read Computer Science/ICT and 1 student out of 116 decided to pursue Nursing.

Table 3 A crosstabulation of level of education science students in female only school decided towards a science-based career and choice of programme

	Choice of programme					
	Engineering	Medicine	Pharmacy	Computer Science/ICT	Nursing	Total
Primary	4 (8.0%)	40 (80.0%)	5 (10.0%)	1 (2.0%)	0 (0%)	50 (100%)
JHS	6 (11.1%)	34 (63.0%)	5 (9.3%)	4 (7.4%)	5 (9.3%)	54 (100%)
SHS	4 (33.3%)	5 (41.7%)	1 (8.3%)	1 (8.3%)	1 (8.3%)	12 (100%)
Total	14	79	11	6	6	116

P= 0.081, χ^2 = 14.025, df = 8

Chi square test was used to establish if there was any relationship between the level of education at which female students in female only school made choices of programmes to pursue at the university. P obtained from the chi square was 0.081. The significance level at which the test was run was 0.05. As the P obtained was greater than 0.05 it means there is no

significant relationship between the educational levels at which students in female only school choose the programme they will pursue in the university.

Influence of type of school on choosing an ICT based programme

Table 4 shows the results of a cross-tabulation of type of SHS attended and what science-based programme they will like to pursue in the university. In the co-educational schools, 10 (9.1%) students decided to choose Computer/ICT and 100 (90.9%) decided to choose a non Computer/ICT programme. In female-only schools 6 (5.2%) students decided to choose Computer/ICT and 110 (94.8%) decided to choose a non Computer/ICT programme.

Table 4 A crosstabulation of type of school and students choice of programme

	Choice of programme		
School	Computer Science/ICT	Non Computer Science/ICT	Total
Mixed	10 (9.1%)	100 (90.9%)	110 (100%)
Female	6 (5.2%)	110 (94.8%)	116 (100%)

P= 0.251, χ^2 = 1.318, df = 1

Chi square test was used to establish if there is any relationship between the number of students in mixed sex schools and female only schools who chose Computer Science/ICT and those who chose non-Computer Science/ICT. P obtained from the chi square was 0.251. The significance level at which the test was run was 0.05. As the P obtained was greater than 0.05 it means there is no significant relationship between relationship between the number of students in mixed sex schools and female only schools who chose Computer Science/ICT and hose who chose non Computer Science/ICT.

DISCUSSION

Distribution of students' choice of career

Most of the students chose careers that were not mathematically involving. Choosing engineering as a career was higher in the female single sex schools compared to female students who were in co-educational schools. Medicine was the most preferred career choice among students. Medical doctors are held in high esteem in Ghana. The prestige of being a medical officer may be what influenced students to choose medicine as a career. This was evident among students in both types of schools. Nine percent of students in co-educational and 5.2% of students in female only senior high schools chose Computer Science/ICT as a career choice. Students may not be aware of jobs in Computer Science/ICT hence, the low percentage of students choosing it as a career. This low percentage could also be affected by the lack of female role-models and support in the school. Gender stereotyping could also be a factor in fewer students choosing Computer Science/ICT as a career. Male teachers of ICT still vastly out-number their female counterparts, and where ICT is taught in different parts of the curriculum it is often men that are in charge of organising access to the hardware and networks. This reinforces gender-stereotyping in school. At home, parents reinforce this by being more likely to buy their sons computers. Women in senior positions in the computer industry are vastly out-numbered. Durndell, Glissov, and Siann (1990) shows that the major reason for girls' lack of interest in ICT at a higher education stage was the male-orientated atmosphere of computer science courses.

The results show that girls in mixed schools are more predisposed to selecting ICT as a career. This contradicts Scott (1996) who reported that girls have more positive attitudes toward ICT if they were in single-sex classes or schools, rather than mixed-sex settings. Factors influencing this choice of career among females in co-educational senior high schools are beyond the scope of this paper and will be addressed in another paper. To hazard an explanation, it could be said that, interactions between the sexes and possibility of discussing future careers between sexes might have played a role in opening this as career option for such females.

Stage of education and decision on a science based career

The results showed that there was no significant difference among the stages of education of students and their choice of future career. Students in single sex schools and co-educational schools did not show any difference in when they decided on a science-based career. This is because basic education is coeducational and the students will have made their choices of career before entering senior secondary schools. Students selected for STME clinics are usually among the best science students in class. These students have already opted for a career in the sciences. Effort should rather be made to entice other students preferable at the basic level who have not made up their mind to pursue science-based careers. Counselling on career choices should be done preferably in the primary schools to entice students into Computer science/ICT careers.

Influence of type of school on choosing an ICT based programme

The findings show that the type of school attended does not influence career choices in Computer Science/ICT or non-Computer Science/ICT. During STME clinics, students use computers because of the educational software installed on them but not introduced to computer science/ICT as a subject. Students are therefore less inclined to take computer science/ICT as a career.

CONCLUSION

Senior high school female students are more inclined to choosing careers that are less mathematically involving and therefore less inclined to choosing Computer Science/ICT as a career. The stage of education has no influence on students choosing a science-based career. School type does not influence career choices in Computer Science/ICT or non-Computer Science/ICT.

RECOMMENDATIONS

Counselling services in the basic schools should be improved so as to provide pupils with information on career choices.

Pupils in basic schools should be exposed to Ghanaian females who have reached great heights in the sciences, engineering and ICT.

Further research is required to find factors influencing the choice among female students in co-educational senior high schools to opt for ICT.

SUGGESTIONS

Proactive and positive exposures to early computer experiences may create enthusiasm for girls who may later consider entering the field of Computer Science/ICT.

REFERENCES

Durndell, A., Glissov, P., & Siann, G. (1990): Gender Differences and Computing in Course Choice at entry into Higher Education. British Educational Research Journal, 16(2), 149-162.

Faulkner, W., & Stewart, J. (2003). National ICT training for teachers: A case of "gender blindness"? Volume 1 of IST-2000-26329 SIGIS Project. Retrieved 5-9-2010 http://www.rcss.ed.ac.uk/sigis/public/documents/SIGIS_D03_2.09_UEDIN3.pdf

Girls' Education Unit Basic Education Division, (2001). A national vision for girls' education and a framework for action - Charting the way forward, Accra: Ghana Education Service.

Henwood, F. (1996). WISE choices? Understanding occupational decision-making in a climate of equal opportunities for women in science and technology, *Gender and Education, 8(2),* 199-214.

Miliszewska, I & Sztendur, E.M. (2010). Interest in ICT Studies and Careers: Perspectives of Secondary School Female Students from Low Socioeconomic Backgrounds *Interdisciplinary Journal of Information, Knowledge, and Management* 5 Retrieved 17-11-2010, from http://jite.org/documents/Vol9/JITEv9IIPp143-166Miliszewska797.pdf

Scott, V. A. (1996). Why are girls underrepresented? Ten years on. *Australian Educational Computing, 11*(1), 17-21