Constraints Encountered by Secondary Schools in offering Computer Studies

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Abstract
Computer literacy is indispensable for a workforce to compete favorably in this increasingly computerized environment. Most organizations and institutions advocate for its workforce to be computer literate. This calls for schools to equip more students with computer skills. This quantitative research involved survey research design to establish constraints encountered by schools while teaching computer studies. Probability sampling technique which involved stratified and random sampling techniques was used to arrive at a sample size of 16 of the 52 secondary schools within Bungoma County which offer computer studies. Primary data was collected using questionnaire, observation and discussion. Primary data was collected using questionnaire, observation and discussion. To ensure quality of the research data and to ascertain the instruments' reliability, a pilot study was performed, face and content validity were also performed on the data collection instruments. Quantitative data was analyzed using both descriptive and inferential statistics and presented in form of frequency tables, percentages, bar graphs, line graphs and pie charts. The research findings revealed that many secondary schools shy away from offering computer studies due to financial constraints to equip their computer laboratories.

Keywords: Computer literacy, computer studies, computer laboratories, Computer systems, computing skills

1. Introduction

A vibrant economy requires a highly skilled and educated workforce with skills and apptitude in the application of computing technology for sustainable development. The ongoing technology revolution has made organizations and institutions to embrace new ways of capturing, processing, storing and displaying information (Mangesi, 2010) and is capable of increasing productivity and competitiveness through information provision. The importance of ICT is widely recognized both in the workplace and at home (Preston *et al*., 2000). Its role in the efficiency, effectiveness and service delivery of any institution is undoubtedly vital (Nejjai, 2012) and has in turn led to increased dependency on computer technology.

Preparing students for the future goes beyond class theory work, the students have to be imparted with skills which are required in their daily lives such as computing technology. This is in line with (Mndzebele, 2013) who asserts that for a workforce to compete favorably at the global level, it needs to be educated, highly skilled and poses skills and aptitude in the application of ICT. In Kenya, the Ministry of Education Science and Technology introduced computer studies as a learning subject in the Kenyan education curriculum in 1994 to enable students gain computer literacy at an early stage in their academic endeavor (MoE, 2000).

No one can deny the importance of a computer system to human life following its pervasive and ubiquitous nature. The ability to effectively use the computer system has become an indispensable part of everyone's education. A lot of people use computer systems more often than they use papers especially in offices for keeping records, doing calculations, data processing, composing and even chatting as attested by (Wambugu, 2009). Many skills are acquired through learning computer studies such as book-keeping, stock-taking, administrative and clerical work. Reffell and Whitworth, (2002) elaborate that these skills are composed of a set of computerized practices that form the core IT skills package: word processors, spreadsheets, and databases. This study arose out of the concern that the number of students emerging from secondary school level who are computer literate is low compared to the overall candidature yet the emerging job opportunities require a computer literate workforce.

2. Literature Review

Computer studies, which gives students the skills required for computer literacy is at different levels across the world. This is affected by the level of civilization and when computer systems began being used in the different countries. Wanjala (2013) asserts that in developed countries, computer systems began to appear in school and university classrooms for education purposes around early 1980s while it was more limited in learning institutions in developing countries. A research carried out by Hermes, (2008) about the history of computers reports that in Britain, computers were in use in many schools by the year 1984. A different report by the United States Department of Education in 1996 pointed out that computer systems were a basic requirement for students in the classroom. This is contrary to countries in Africa. A report from the Ministry of Education (MoE), Kenya in 2000 attests that computer studies was introduced into the learning curriculum in 1994.

The rate at which students take computer studies is low as elaborated by a report by the Kenya National Examination Council in 2013 which indicates that in 1998 the number of students who enrolled for computer studies national examination was twenty two (22) candidates and has since then risen over the years to six thousand nine hundred and forty (6,940) candidates by the year 2013 (KNEC, 2013).

Different researches have been carried out across the world highlighting the constraints encountered by learning institutions in offering computer studies. Research findings of a study carried out by Ihmeideh, (2009) in Jordan elaborates that high subscription fee, cost of ICT infrustructure coupled with poor quality of services from service providers, lack of basic infrustructure like electricity among others are barriers to both teaching and using ICT in education. Research findings from a study carried out by Mandoga *et al*., (2013) about challenges and opportunities in harnessing computer technology for teaching and learning in schools pointed out that challenges of bandwidth capacity, interrupted power supply and shortage of qualified teachers had hampered the efficient use of computers in many schools within Zimbabwe. The study also highlighted that limited number of computer systems minimized the number of students taking computer studies.

Problems associated with insufficient number of computer systems include difficulties in maintaining computer systems, supporting the software and balancing the access between ICT

lessons and ICT across the curriculum (Becta, 2004). Several findings by different researchers in recent years implied that another main reason for limited ICT use in schools was teachers' limited confidence and understanding of the scope of ICT for their teaching subject (Cox & Webb, 2004).

In 2008, Richardson performed a research through secondary data on 'the state of ICT in Cambodia indicated that by 2004, only 13% of six hundred and ninety eight (698) secondary schools used electricity, 8% used generators while 4% used solar panels. He further pointed out that only 6% of lower and 35% of upper secondary schools managed to get one – to-two (1-2) computer systems mainly for administrative purposes. This is an indicator that coming across schools offering computer studies in Cambodia was rare as at 2004.

Technology is undoubtedly expensive and financial plans are essential for schools to catch up with rapid changes and improvement in hardware, software and networks. Gulbahar, (2007) asserts that using up-to-date hardware and software resources is a key feature in the diffusion of technology which is a rare experience in the learning institutions. For there to be an effective and efficient generation of a computer literate workforce, there should be availability of hardware, software and access to resources by both teachers and students (Goktas *et al*., 2009).

This research was after bringing out the challenges experienced by schools in offering computer studies to students at secondary school level. The data analysis brings out the different challenges in order from the one which affects most schools to the least. The results also show why many schools shy away from offering computer studies.

3. Research Methodology

This was a quantitative research which involved gathering data about opinions and views about challenges which schools encounter while offering computer studies. It helped the researcher have more accurate and precise knowledge about the subject matter under study. Quantitative research design is the technique and measurements that produces quantifiable/discrete values (Kothari, 2007). Survey research design used a standardized instrument to collect standardized

data from a large number of respondents (McNeill & Chapman, 2005). It helped provide a quantitative description of trends, attitudes and opinions of a population by studying a sample of that population. Probability sampling technique was used to come up with a sample size of thirty percent (Kothari, 2004) of schools which offer computer studies within Bungoma County. Stratified and simple random sampling techniques were used to pick the schools to take part in the research from the different strata (National, Extra-county, County and Sub-county school levels) with respect to the apportioned numbers.

Table 3.1: Proportional allocation of schools offering computer studies

School level	**No. of Schools**	**No. of schools offering computer studies**	**No. of schools selected for data collection**
National schools	2	2	1
Extra-County schools	8	8	2
County schools	33	15	5
Sub-county schools	235	27	8
Total	278	52	16

Questionnaires were used to collect data from the respondents. The questionnaire was a form containing questions which were factual and had been designed to assist the researcher in securing data about the constraints faced by schools while offering computer studies from teachers of computer studies who were presumed to have knowledge (Singh, 2006). The questionnaires attempted to focus the respondents' mind to the research topic and provided the direction of approaching the topic. The questionnaire was intricately designed to establish the constraints encountered while offering computer studies in secondary schools.

Quality control for this research was ensured by using both validity and reliability. Face and content validity were considered. Face validity refers to the researcher's subjective assessments of the presentation and relevance of the measuring instrument as to whether the items in the instrument appear to be relevant, reasonable, unambiguous and clear (Oluwatayo, 2012). Content validity ensures the elements of the main issue to be covered in a research are a fair representation of the wider issue under investigation and the elements chosen for the research sample are addressed in depth and breadth as asserted by Cohen *et al.* (2008). A pilot

study was conducted to ascertain reliability of the questionnaires that were used in this research and that there was no ambiguity in the questions. The reliability of the questionnaire was analyzed using Cronbach's alpha where the Cronbach's alpha value was .746 while the Cronbach's Alpha value based on standardized items was .827. If the Cronbach's Alpha value is between 0.70 and 0.8 the tool will be within the confidence interval and a researcher can proceed to use their reliable scales with greater confidence in their results (Iacobucci & Duhachek, 2003).

4. Data Analysis, Presentations and Interpretation

4.1 Number of teachers of computer studies

The first question sought out the number of teachers employed to teach computer studies as their major subject. It was deduced that 21% of the secondary schools offering computer studies had employed two (2) teachers to teach computer studies as their major subject, 71% of the schools had one (1) teacher employed to teach computer studies as their major subject while 7% of the schools depended on a teacher employed to teach other subjects to also teach computer studies. 21% of the schools had one (1) teacher offering computer studies yet was employed to teach other subjects.

A correlation between the number of teachers employed to teach computer studies as their major subject to teachers offering computer studies as their minor subject was performed as indicated in Table 4.1.

We can infer that there is a negative correlation having a Pearson Correlation coefficient of -.483 significant at .080 level based on 2-tailed test and a sample size N = 14. This implies that as the number of teachers employed to teach computer studies increases, the number of teachers teaching computer studies as a minor subject decreases.

Table 4.1: Correlation of teachers offering computer studies

		Number of teachers teaching computer studies- as major subject	Number of teachers teaching computer studies- as minor subject
Number of teachers teaching computer studies- as major subject	Pearson Correlation	1	-.483
	Sig. (2-tailed)		.080
	N	14	14
Number of teachers teaching computer studies- as minor subject	Pearson Correlation	-.483	1
	Sig. (2-tailed)	.080	
	N	14	14

When schools lack or do not have enough teachers of computer studies, they resort to the teachers available who teach other subject in offering computer studies which should not be the case since the students are likely to get a raw deal in their studies.

4.2 Ratio of students to computer systems

The ratio of the total number of students in the schools offering computer studies to the number of computer systems available for computer studies was analyzed.

Table 4.2 shows the ratio of students in schools offering computer studies to the computer systems available for computer studies had an average of 29:1. The data collected also indicated that the ratio of students taking computer studies to computers had an average of 10:1. It is also evident that the schools had minimized the number of students taking computer studies by a ratio of 3:1 so that the computers could be enough for studies.

Table 4.2: Ratios of students to computer systems

School type	Total number of students	Students taking computer studies	No. of computers in working condition	Ratio of students to computers	Ratio of students taking computer studies to computers
National schools	1050	126	49	21:1	3:1
Extra-county schools	2422	1468	75	32:1	20:1
County schools	3062	615	109	28:1	6:1
Sub-county schools	3437	977	114	30:1	9:1
Total	**9971**	**3186**	**347**	**29:1**	**10:1**

4.3 Ratio of students taking computer studies

An analysis was performed to ascertain if there was a relationship between the number of students in a secondary school and the number of students who took computer studies.

Table 4.3: Ratio of students taking computer studies

	Mean	N
Number of students in the school	770.64	14
Number of students taking computer studies	227.57	14

With respect to the collected and analyzed data, Table 4.3 indicates that there was a mean of seven hundred and seventy one (771) students in secondary schools and a mean of two hundred and twenty eight (228) students who took computer studies in these schools. This indicated that 29.5% (227.57/770.64) of the students in secondary schools which offered computer studies took it as one of their learning subjects.

Table 4.4: Correlation of students taking computer studies

Table 4.4 indicates a correlation between the number of students in a school to the number of students taking computer studies in schools which offer computer studies.

		Number of students in the school	Students taking computer studies
Number of students in the school	Pearson Correlation	1	.631*
	Sig. (2-tailed)		.016
	N	14	14
Students taking computer studies	Pearson Correlation	.631*	1
	Sig. (2-tailed)	.016	
	N	14	14

*. Correlation is significant at the 0.05 level (2-tailed).

It can be inferred from Table 4.4 that there is a strong positive correlation with the Pearson correlation coefficient, r = .631 significant at 5% level based on 2-tailed test and a sample size, N = 14. This implies that as the number of students in a school offering computer studies increases, the number of students taking computer studies also increases.

Table 4.5: Correlation between teachers and students of computer studies

We can infer, from Table 4.5 that there is a strong positive correlation between the numbers of teachers employed to teach computer studies and students taking computer studies having a Pearson Correlation coefficient of .614 significant at 5% level based on 2-tailed test and the sample size, N = 14.

Table 4.5 indicates a correlation performed between the number of teachers who offer computer studies and the number of students of computer studies.

		No. of Teachers employed for computer studies	No. of students taking computer studies
No. of teachers employed for computer studies	Pearson Correlation	1	.614*
	Sig. (2-tailed)		.020
	N	14	14
No. of students taking computer studies	Pearson Correlation	.614*	1
	Sig. (2-tailed)	.020	
	N	14	14

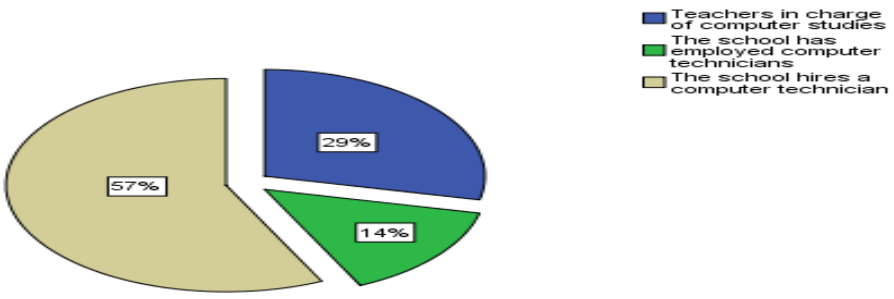
*. Correlation is significant at the 0.05 level (2-tailed).

This implies that as the number of teachers employed to teach computer studies increases, the number of students allowed to take computer studies also increases.

4.4 Maintenance of Computer Systems

The researcher sought to find out who performs maintenance of the computer systems. Majority of the schools (57%) hired a computer technician to perform the maintenance services on the computer systems. 29% of the secondary schools made use of the teachers who taught computer studies to perform the maintenance and servicing of the computer systems while 14% had employed computer technicians as depicted in Figure 4.1.

Figure 4.1: Maintenance of Computer systems



4.5 Aspects about computer studies

In this section, the researcher sought to find out different views of respondents about different aspects of computer studies. The questions were posed in likert scale format.

Table 4.6: Computer Studies for all students in secondary schools

	Frequency	Percent (%)
Strongly disagree	0	0
Disagree	0	0
Neutral	2	14
Agree	6	43
Strongly agree	6	43
Total	**14**	**100.0**

From the data collected, 43% of the respondents strongly agreed that computer studies should be offered to all students at secondary school education level; a similar percentage (43%) agreed to the same while 14% were neutral about it as depicted in the Table 4.6.

The researcher wanted to know the respondents' views about having internet connectivity for students to use for studies. Table 4.7 illustrates the response on a likert scale format.

Table 4.7: Internet connectivity in schools

	Frequency	Percent (%)
Strongly Disagree	0	0
Disagree	1	7
Neutral	1	7
Agree	4	29
Strongly Agree	8	57
Total	**14**	**100.0**

From the data collected, as illustrated in Table 4.7, 57% of the respondents strongly agreed that there should be internet connectivity to enhance studies, 29% of the respondents agreed, 7% were neutral while another 7% disagreed.

The last aspect was the respondents view on the importance of computer skills on preparing students for employment opportunities.

Table 4.8: Computer studies contribution to skills generation

	Frequency	Percent (%)
Strongly Disagree	0	0
Disagree	0	0
Neutral	1	7
Agree	3	21
Strongly Agree	10	72
Total	**14**	**100.0**

The data collected about the respondents' views suggested that majority of the respondents (as illustrated in Table 4.8) at a percentage of 72% strongly agreed, 21% of the respondents agreed while 7% were neutral.

4.6 Bottle-necks for offering computer studies in secondary schools

This section looked at some of the factors attributed to many secondary schools not offering computer studies. The factors are displayed in Table 4.9 ranked with respect to their percentages in a descending order.

Table 4.9: Bottle-necks to offering computer studies

Bottle-necks for offering computer studies in schools	Frequency	Percent (%)
Inadequate ICT facilities in schools	14	100
High cost of ICT components	13	93
Inadequate teachers for computer studies	12	86
Limited school budget	12	86
Lack of maintenance culture	11	79
Poor perception of ICT among teachers and administrators	9	64
Frequent electricity interruption	5	36

N= 14

Inadequate ICT facilities in schools ranked highest with 100%. Insufficient number of computers and peripheral devices made many schools shy away from offering computer studies. High cost of ICT components ranked second at 93%. Most secondary schools opted not to offer computer studies because of cost constraints. Inadequate teachers for computer studies attracted 86%. This was evident during data collection where most schools had only one teacher teaching computer studies. Limited school budget had 86%. This was also evident in schools which offered computer studies as most of them had purchased few computers for computer studies. Lack of maintenance culture had 79%.

Poor perception of ICT among teachers and administrators had 64%. During data collection, some respondents claimed that some administrators avoided inclusion of computer studies in the school curriculum claiming that it was an expensive affair to buy and maintain computers. Frequent electricity interruptions ranked last with 36%.

5. Conclusion

From the findings of the study, it was concluded that the ratio of students in schools offering computer studies to the computer systems available for computer studies had an average of 29:1. However, the schools had opted to have one student in every three (ratio 3:1) to take computer studies which had reduced the ratio of students taking computer studies to computer systems available for the subject to an average of 10:1.

On the aspects which make schools shy away from offering computer studies, inadequate ICT facilities in schools ranked highest with 100% while high cost of ICT components ranked second at 93%. Limited school budget and inadequate teachers for computer studies came third attracting 86% each. Lack of maintenance culture had 79% while poor perception of ICT among teachers and administrators had 64%. Frequent electricity interruptions ranked last with 36%.

29.5% of the students in secondary schools which offer computer studies took computer studies as one of their learning subjects. As the number of teachers teaching computer studies in a school increased, the number of students being taught computer studies also increased.

6. Recommendation

Computer system donations by the Government of Kenya, Ministry of Education and other stake holders should be channeled to sub-county schools and schools which do not have computer systems for computer studies so that an increased number of students can have the chance to learn computer skills.

7. Suggested areas for further research

Impact of computer skills gained in schools on generating a computer literate workforce to bridge digital divide

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