Implications of Teachers' Capacity on the Implementation of Computer Studies Curriculum in Public Secondary Schools in Bungoma County, Kenya

Wandili Austin Murambi[1], Carolyne Nabwoba Simiyu[2], Rose Mutende[3]

Department of Curriculum and Pedagogy, Kibabii University

DOI: https://dx.doi.org/10.47772/IJRISS.2023.70863

Received: 10 July 2023; Revised: 28 July 2023; Accepted: 01 August 2023; Published: 25 August 2023

ABSTRACT

The government of Kenya introduced the implementation of a computer studies curriculum in 1996. However, descriptive statistics of various studies carried out have never established why only a few schools registering a low number of candidates offer computer studies at KCSE examinations and worst of all is the varied performance registered nationally and more so in Bungoma County. This study therefore purposed to evaluate the influence of teacher capacity on the implementation of computer studies curriculum in public secondary schools in Bungoma County, Kenya. This was achieved by determining the availability and utilization of qualified computer studies teacher capacity on the implementation of the computer studies curriculum in Bungoma County. The study was survey research design and stratified the schools into categories of national, extra county, county and sub county schools. Aside from national schools where the census was used to select schools to participate, simple random sampling was employed to select the schools. Purposive sampling was used to select random respondents from selected schools that offer computer studies at KCSE which represented a

sample size of 35 percent. Questionnaires, interviews, document analysis and observation were used to gather the required data. This study obtained information concerning adequacy and utilization of computer studies teacher capacity influence on the implementation of computer studies curriculum. Therefore, this study established that there was a relationship between adequacy of computer studies teacher capacity and curriculum implementation. Availability of teacher capacity influenced both computer studies performance and students' enrolment at KCSE. The study therefore recommended that adequate computer studies teachers be availed to public secondary schools and be utilised for proper implementation of computer studies curriculum. This study would benefit principals in making informed decisions concerning whether to implementor not offer computer studies in their schools as well as other education stakeholders such as policy makers, teachers and computer technicians among others.

Keywords: Computer studies teacher capacity, Computer studies curriculum implementation, computer studies student enrolment, KCSE computer studies performance

INTRODUCTION

The introduction and implementation of computers studies as a new subject in Kenyan secondary schools were a critical issue that required a clear government policy guidance on how schools should offer the subject. Therefore, computer studies curriculum implementation in schools largely depend on how teachers and educational stakeholders allocate time framework and build a structure for the whole school (Jonyo & Jonyo, 2019). This is because the subject is offered by only a few schools as an optional subject of study and the few schools the enrolment in the subject is very low.

Computer Studies curriculum implementation in secondary schools emphases the number of schools offering the subject, students taking the subject and the outcome performance in Kenya Certificate of Secondary Education (KCSE), however since the introduction of the subject there has been little literature on the resources required to implement its curriculum. This study investigated computer studies curriculum implementation in public secondary schools intending to find out which schools implement Computer studies curriculum and why other schools do not offer the subject.

Since the introduction of Computer studies in the Curriculum of Secondary Schools in Kenya in 1996, the implementation of the curriculum was a challenge to many as there were not enough qualified teachers who felt that the subject was difficult and were uncomfortable using the new resources in instruction process (Staufenberg, 2018). It's in this regard that the researcher sought to evaluate the influence of computer studies teacher capacity in computer studies curriculum implementation in Bungoma County. Worldwide studies on the factors influencing computer studies curriculum implementation in secondary schools emphasise on the adequacy and availability of teaching learning resources and physical facilities (Changilwa & Akala, 2017). The availability and effective use of teaching and learning resources are key determinants of the quality of Computer education in any country since they promote the quality of instruction by increasing student participation and assist teachers in the complex task of supporting instructional programs and managing students in a class (Darling-Hammond, Flook, Cook-Harvey, Barron & Osher, 2020).

The Human Resources (HR) of a school consists of all staff (teaching, administration and technical staff) engaged in any of the school's activities. It is well-recognised that the human resources of any school are the most valuable asset (Oluwadare, Adetunji & Adekemi, 2020). Computer studies teachers' qualification is not directly linked to their experience in implementing any curriculum.

Teachers' quality and dedication are significant predictors of educational output (Kintu and Kagambe 2017). David (2020) opined that teachers hold the key to nation education building, and aspiration of any nation transformation can only be possible if there are qualified, competent and dedicated teachers that impact the appropriate attitude skills and knowledge towards education technology. The success or failure of any curriculum implementation depends to a considerable extent on the availability of human resources, especially the teachers, technicians and principals at the secondary school level, since they constitute skilled manpower and work force of all grades and types in the entire school system (Mumbua, Mutua, Kinyili & Arasa, 2017).

Wandera, Imonje, and Akala (2019); Rivera (2020) noted that teachers who have been in the system for a long have experience and usually post high mean scores in their subject areas since they are hands-on in preparation for their lessons and keen on student digression from performance. Teachers who are still young in the profession are likely to post decimal results as they are still learning new approaches to utilising the available resources in teaching. Ladd and Sorenson (2017) indicated that teachers' experience cumulatively affects students' performance. A well-experienced teacher is likely to post better results as compared to novice teachers. Casian, Mugo, and Claire (2021) and Wandera, Imonje and Akala (2019) acknowledged teaching experience as a global issue that influences the implementation of classroom activities and students' activities. Many studies have failed to identify consistent significance between students' performance and the available educational resources Blomeke et al. (2016) hence the study was undertaken to evaluate the gap.

Teachers' workload determines the acceptance or rejection of available resources in the class instruction process. It is believed that incorporating computer educational resources in teaching usually increases the teacher workload in terms of constant upgrades and maintenance of education software, creating student emails for online learning, and teaching new skills. Teachers spend more time adjusting resources thus occupying the students' time. In contrast to utilization of resources in the instruction process, they require a continuous search of suitable approaches to use them in instruction hence increasing the workload.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VII Issue VII July 2023

Therefore, a teacher with less workload and high technical support is likely to be more effective in using resources in instruction.

No matter how adequate and available the teaching and learning resources are in a classroom, lesson delivery cannot be guaranteed in the absence of the teacher (Wambua & Murungi, 2018). Computer studies teachers' workload of keeping students' records daily has been reduced significantly through utilization of teaching learning resources that enable them to formulate and implement online schemes of work, lesson notes preparation and use of projectors for online learning which reduce the need of teachers writing lesson notes and boast teachers time for computer studies curriculum implementation in schools which foster good performance. Inadequately trained professionals (computer teachers and Computer technicians) usually obstruct the use of resources in enhancing teaching and learning (Okongo, Ngao, Rop, & Nyongesa, 2015; Kochung 2011). Therefore, computer science teachers need training on the utilization of the available resources in schools.

Most teachers in Kenya have undergone training and are qualified to perform any responsibility assigned to them which resultsin positive outcomes in the students' performance in KCSE examinations which account for students' evaluation of classroom teaching learning activities.

The basic education curriculum framework captured digital literacy as one of the core competencies reinforcing the importance of computer science as a subject. However, to date, only a few schools and a low number of candidates take the subject at KCSE due to some unidentified factors like insufficient numbers of computers, lack of ICT knowledge/skills, insufficient peripheral devices and lack of qualified ICT personnel.

Problem Statement

Computer studies is seen as a subject of great potential for the future of students beyond the classroom of all subjects at the KCSE level. However, despite the Kenyan government's effort to bridge the digital divide by introducing computer studies in the secondary school curriculum in 1996, most public secondary schools have not made an effort towards implementing it and hence there is a low number of candidates taking computer studies at KCSE examinations (Macharia, 2013). According to Ongulu and Khatete (2021), learning resources of which teachers are among them influence students' enrolment in a given subject area which is related then to the subject's curriculum implementation. Statistics of students offering the subject derived from the KNEC reports for between 2018 and 2022 are provided in Table 1.

Table 1. National Enrolment Ratio of Computer Studies Candidates

Year	Computer Studies Candidature	Total candidates	% of computer studies candidates
2018	15162	658904	2.30
2019	19406	694445	2.79
2020	25704	742796	3.46
2021	30897	822376	3.76
2022	36513	877128	4.16

Source: KNEC report, 2022

In particular, few students register computer studies across the schools implementing computer studies education. Further varied performance by computer studies students in the KCSE examination lacks literature to inform on the teacher capacity influence on the schools' computer studies curriculum implementation. According to Ibukun, Oyetakin, and Ayandoja (2012), good performance by students

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VII Issue VII July 2023

within a given subject and school is determined by the adequacy of resources, amongst them being the standards of physical facilities and teacher capacity supporting the teaching-learning process.

This study, therefore, established the influence of computer studies teacher capacity on computer studies curriculum implementation in public secondary schools in Bungoma County concerning students' performance and enrolment at KCSE.

RESEARCH METHODOLOGY

The study used a survey design that allowed the collection of data from a predefined group of respondents to gain useful information on the teacher capacity influencing the Computer Studies curriculum

The study was carried out in public secondary schools in Bungoma County. There was a total of 369 public secondary schools in Bungoma County. Of the schools, 63 had implemented computer studies in the curriculum as an examinable subject at Kenya Certificate of Secondary Education (KCSE) and, therefore, formed the target population of the study. From the schools, the respondents were principals, heads of technical departments, teachers and students taking computer studies.

Purposive sampling was employed to select the teachers, computer technicians, heads of department and principals as respondents in the selected schools offering the course since they have a better understanding of challenges. Form three and form four computer studies students were purposively sampled to participate in the study as they have a better experience with computer studies subject learning and, therefore, are better placed to make informed judgements.

The sample size from the schools offering computer studies therefore was 35 per cent as indicated in table 2.

Table 2. Sample size framework table

School category	Category in terms of gender	Total number of schools per category	Total number offering computer studies	Sample	% sample size of schools offering computer studies
National	Boys	1	1	1	100%
	Girls	1	1	1	100%
	Mixed	0	0	0	0
	Total	**2**	**2**	**2**	**100%**
Extra County	Boys	9	9	3	33%
	Girls	7	5	2	40%
	Mixed	0	0	0	0%
	Total	**16**	**14**	**5**	**36%**
County	Boys	19	10	3	30%
	Girls	35	12	4	33%
	Mixed	37	6	2	33%
	Total	**91**	**28**	**9**	**32%**
Sub-County	Boys	5	2	1	50%
	Girls	23	3	1	33%
	Mixed	232	14	4	29%
	Total	**260**	**22**	**6**	**32%**
Total		369	63	22	35%

The tools that were used to collect data in this research include; questionnaires, observation, document review and interview schedules. The use of varied research instruments was the surest way of minimising threats to internal and external validity (Ruchika & Megha 2018; Flannelly, Flannelly, & Jankowski, 2018; Creswell, 2012). The use of questionnaires allows greater uniformity in the way questions are asked and hence ensuring comparability in the process.

To establish the reliability of the questionnaire the value for cronbach's alpha coefficients of items determining a specific variable were established from the pilot study. The Cronbach alpha coefficient for adequacy of computer studies human resource capacity items was found to be 0.777 hence meeting the reliability requirement, while for utilization of computer studies human resource capacity items was found to be 0.792 hence meeting the reliability requirement

DATA ANALYSIS AND DISCUSSION

A. Computer studies teacher capacity influence on the implementation of related curriculum findings based on descriptive statistics analysis

The teachers' attitude and method of teaching greatly influences students' attitude and contribute significantly to attention and performance in class (Murunga, Kwach, & Indoshi, 2019). A 1 to 5 point Likert scale having 1 represented strongly disagreed and 5 strongly agree was used to establish the effect of computer studies teacher capacity on curriculum implementation concerning students' performance as well as enrolment in the KCSE computer studies subject. The findings were as presented in Table 3

Table 3 Utilization of computer studies teachers in schools performance at KCSE

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Computer studies teacher maximum utilization and performance at KCSE	3	2.70%	16	14.41%	5	4.50%	64	57.66%	23	20.72%
Computer studies teacher availability and performance at KCSE	5	4.50%	10	9.01%	15	13.51%	59	53.15%	22	19.82%
Computer studies teacher use of computer resource persons affect performance at KCSE	6	5.41%	39	35.14%	10	9.01%	31	27.93%	25	22.52%
Computer studies teacher use of computer studies Examiners affect performance at KCSE	28	25.45%	20	18.18%	14	12.73%	27	24.55%	21	19.09%

Computer studies teacher-follow up activities in textbooks performance	0	0.00%	1	0.90%	12	10.81%	66	59.46%	32	28.83%
Computer studies teacher use of student participation affect performance at KCSE	1	0.90%	5	4.50%	11	9.91%	50	45.05%	44	39.64%

According to the findings of Table 3, 2.7 per cent of the respondents strongly disagreed, 14.4 per cent disagreed, 4.5 per cent were neutral, 57.7 per cent agreed and 20.7 per cent strongly agreed that maximum computer studies teacher utilization impact on computer studies KCSE performance. A majority of the respondents (78.4 per cent) opined that computer studies maximum teacher utilization affects computer studies students' KCSE performance. This finding is in line with Oluwadare, Adetunji, and Adekemi's (2020) findings which established that human resources of any organization are the most valuable asset, therefore concerning school teachers are critical in enhancing students' performance.

Findings of Table 3, show that4.5 per cent of the respondents Strongly Disagreed, 9.0 per cent disagreed, 13.5 per cent were undecided, 53.2 per cent agreed and 19.8 per cent strongly agreed on the fact that the availability of computer studies teachers in schools has an impact on performance of computer studies at KCSE. Adequacy of teaching and learning resources in class cannot guarantee good performance in the absence of the teacher (Wambua & Murungi 2018). This study's findings agreed since (73.0 per cent) of the opinion from respondents agreed that the availability of computer studies teachers influences on students' performance at KCSE.

Table 3, respondents' opinion in evaluating the influence of utilization of computer studies resource persons on performance revealed that, 5.4 per cent of the respondents Strongly Disagreed, 35.1 per cent Disagreed, 9.0 per cent neutral, 27.9per cent agreed and 22.5 per cent strongly agreed that utilization of computer resource person in schools had impact on students' KCSE performance. The majority of respondents (50.4 per cent) opined that utilization of computer resource persons had an impact on students' performance at KCSE.

Findings of Table 3 show that 25.2 per cent of the respondents Strongly Disagreed, 18.2 per cent Disagreed, 12.7 per cent were neutral, 24.5 per cent agreed and 19.1 per cent strongly agreed that the use of computer studies Examiners influence Computer studies students' performance at KCSE. The respondents' opinions were of equal magnitudes thus no clear direction on the influence of computer studies examiners on students' KCSE performance.

Results in table 3, show that 0.9 per cent of the respondents Disagreed, 10.8 per cent neutral, 59.5 per cent agreed and 28.8 per cent strongly agreed that teachers ability in textbook follow-up activities influenced students' performance at KCSE. The majority of the respondents (88.3 per cent) agreed that teachers' ability in textbook follow-up activities influence students' KCSE performance.

Table 3shows that from the respondent opinions 0.9 per cent Strongly Disagreed, 4.5 per cent Disagreed, 9.9 per cent neutral, 45.0 per cent agreed and 39.6 per cent strongly agreed that teacher ability to enhance students participation in class influence computer studies performance at KCSE. The majority of the respondents (84.6 per cent) agreed that teacher' ability to enhance student participation in class influences students' performance in computer science at KCSE. This study's findings were in line with Frimpong's(2021) findings that resources enhance the student's total participation in class activities which aims at effective learning and performance.

Therefore, this study's findings from basic descriptive statistics established that utilization of computer studies teacher capacity influence computer studies students' performers at KCSE. The majority held respondents' opinions on Computer studies students' performance at KCSE agreed that computer studies maximum teacher utilization, computer studies teacher availability, use of computer resource persons, teacher textbook follow-up activities and computer studies teachers make for student participation during lessons influence Computer studies students' performance at KCSE. This study was validated by research carried out by Nabwoba, Abenga and Mukasa (2020) who opined that the school learning environment of which teacher capacity is part and parcel has an impact on students' performance.

B. Computer studies teacher capacity impact on the implementation of related curriculum findings based on inferential statistics analysis

According to Turhan (2020), where the findings of the significant value in a chi square test of independence is 0.05 or less, the association is said to be statistically significant otherwise it is considered to be statistically insignificant.

To establish the relationship between KCSE computer studies students enrolment in the subject in line with the sufficiency of teachers in the subject, a Chi square test of independence was performed the findings are in Table 4.

Table 4 Qualified Computer studies teacher Average KCSE Enrolment * Qualified Computer studies teacher

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	133.147 a	52	.000
Likelihood Ratio	136.380	52	.000
Linear-by-Linear Association	13.424	1	.000
N of Valid Cases	99		

The Chi square test of independence of association of KCSE computer studies students enrolment with adequacy of qualified computer studies teachers was significant, χ^2 (52, 99) =133.15, p= .000 according to the findings given in Table 4. From the findings, there was a statistically significant relationship. Accordingly, therefore adequacy of qualified computer studies teachers influences the average KCSE computer studies student enrolment in the subject.

In establishing the relationship between computer studies students' enrolment at KCSE in line with the teacher's capacity to manage effective weekly practicals, a Chi square test of independence was performed whose findings were as presented in Table 5.

Table 5 Computer studies teacher capacity to manage effective weekly practicals Average KCSE Enrolment * Computer studies teacher capacity to manage effective weekly practicals

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	131.571 a	52	.000
Likelihood Ratio	133.717	52	.000
Linear-by-Linear Association	10.304	1	.001
N of Valid Cases	99		

In evaluating the statistical significance between students enrolment at KCSE and computer studies teacher capacity in managing effective weekly practicals, table 5 chi square test performed was significant, χ^2 (52, 99) =131.57, p= .000. Therefore computer studies teacher capacity to manage effective weekly practicals influence computer studies students enrolment at KCSE.

A chi square test of independence was performed to examine the association of student enrolment with computer studies teacher capacity manage teaching and learning resources. The findings of the test were as shown in Table 6.

Table 6 Computer studies teacher capacity to use of teaching-learning resources Average KCSE Enrolment * Computer studies teacher capacity to use of teaching-learning resources

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	112.132 a	52	.000
Likelihood Ratio	115.311	52	.000
Linear-by-Linear Association	.519	1	.001
N of Valid Cases	98		

The association of students' enrolment with Computer studies teacher capacity to manage teaching and learning resources was significant, χ^2 (52, 98) =112.13, p= .000 from Table 6, findings there was a significant statistical relationship between Computer studies teacher capacity to manage teaching and learning resources and students enrolment at KCSE in computer studies.

The findings of the Table 7 show a chi square test of independence performed to examine the relationship between KCSE student enrolment and computer studies teacher adequacy.

Table 7 Computer studies teacher adequacy Average KCSE Enrolment * Computer studies teacher adequacy

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	107.393 a	52	.000
Likelihood Ratio	103.551	52	.000
Linear-by-Linear Association	7.696	1	.006
N of Valid Cases	99		

The above table tested the relationship of KCSE student enrolment and computer studies teacher adequacy. The results revealed that it was significant, χ^2 (52, 99) =107.39, p= .000 based on the values in table 7. About these findings, there was a significant statistical relationship between computer studies teachers' adequacy and computer studies students KCSE enrolment at KCSE.

Test of independence was performed to examine the association of KCSE student enrolment and Computer studies teacher capacity to apply logical manner of lesson presentation. The findings were as shown in Table 8.

Table 8 Computer studies teacher capacity to apply logical manner of lesson presentation Average KCSE Enrolment * Computer studies teacher capacity to apply logical manner of lesson presentation

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	79.675 a	52	.008
Likelihood Ratio	57.402	52	.002
Linear-by-Linear Association	6.135	1	.013
N of Valid Cases	42		

In a chi square test to evaluate the association of KCSE student enrolment with computer studies teacher capacity to apply logical manner of lesson presentation was significant, χ^2 (52, 42) =79.66, p= .008. From these findings there was a significant statistical relationship between computer studies teachers' capacity to apply logical manner of lesson presentation and the average KCSE computer students' enrolment in Computer science subjects.

Based on these findings, therefore, it was summarised that adequacy of computer studies teachers capacity to manage effective weekly practicals, apply logical manner of lesson presentation and use teaching and learning resources all had influence on computer studies enrolment at KCSE. Therefore, there was an association between the adequacy of computer studies teachers/ technician capacity and computer studies curriculum implementation.

SUMMARY OF FINDINGS AND CONCLUSIONS

The study sought to determine computer studies teacher capacity influence on computer studies curriculum implementation. The findings presented in sections 3.1 and 3.2 revealed; textbooks follow-up activities and student participation during computer studies lessons affect computer studies students' KCSE performance. The comparison in performance between a national school and a sub county school was varied. It was revealed that national schools had a high capability of accessing the computer studies teacher capacity which gave them a wider scope as opposed to sub county schools that had a very minimal capability. The teacher capacity was further evaluated in terms of utilization. The findings revealed that; maximum utilization of computer studies teachers, greatly influenced computer studies KCSE performance. This was because teachers had great input in practical sessions which gave students a good background. Nevertheless, adequacy of computer studies teacher personnel, trained computer studies teacher capacity, resource persons in teaching and learning, and logical computer studies lesson presentation by teachers did not effect on computer studies students' enrolment in public secondary schools in Bungoma County. Therefore, the adequacy of teacher capacity in schools did not influence computer studies curriculum implementation. The inferential findings revealed that; there was a significant statistical relationship between utilization of computer teachers in schools, maximum utilization of computer studies teachers, teacher ability in textbooks follow-up activities, student participation in lessons, utilization of computer studies examiners and computer studies students' KCSE performance. There was also a significant statistical relationship between the adequacy of computer studies teacher capacity to manage effective weekly practical's, capacity to manage teaching and learning resources, application of logical manner of lesson presentation, and computer studies students' enrolment at KCSE in Bungoma County. Therefore, adequacy of computer studies teacher capacity had a significant statistical relationship with computer studies curriculum implementation in public secondary schools in Bungoma County.

RECOMMENDATIONS

The study recommended that adequate computer studies teachers be availed to public secondary schools in

Bungoma County and be utilised for proper computer studies curriculum implementation. This is likely to result in high student enrolments and better performance in the subject at KCSE.

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