



Emerging Issues in the Implementation of Computer Technology into Kenyan Secondary School Classrooms

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ABSTRACT

This paper reports of a study that examined factors that affects the implementation of Computer Integrated Education (CIE) in secondary schools in Nyanza Province, Kenya. The results from a semi-structured interview with 80 computer teachers in Girls, Boys and mixed public secondary schools in Nyanza Province are discussed with reference to their implications for the use of computers as tools for teaching and learning. Data analysis combined qualitative and quantitative methods. The data described experiences drawn from female and male teachers working in urban, sub-urban and rural areas. The research findings revealed five major problems besides other issues as: non-availability of computers or inadequate supply of computers in most of secondary schools in Nyanza Province of Kenya; lack of proper teacher training to help them integrate computers into teaching and learning; lack of time to incorporate computers into teaching subject teaching; inadequate or lack of physical facilities to enable schools to introduce computer education and lack of relevant software. The author analysed these problems and provided suggestions as to how they can be overcome to help strengthen the introduction and integrating computers into secondary schools in Nyanza Province of Kenya.

Keywords: *computers, Implementation, secondary schools, Nyanza Province, teaching/learning*

1. INTRODUCTION

Many third world countries are currently developing educational policies on the use of computers in secondary schools with an aim to help improve the quality of learning, and that they are necessary to prepare students to function successfully in a technological world by acquiring computer literacy skills; and to enhance productivity and performance. However, recent research findings from developed countries on the implementation of computers in teaching and learning stress the importance of establishing effective utilization programme, with particular emphasis on integration of computer use into subject content areas and curriculum unit (Dockstader 1999).

Therefore, if the integration and use of computer technology in the classroom is to be effective, the inherent problems of teachers and other issues need to be addressed so that a possible solution could be found. Otherwise schools will continue to face under-utilization of computers for instructional purpose. Some of these problems are teacher- related others are concerned with school administration and the government at large. Issues such as teacher training, attitudes, time, availability of computers, accessibility, physical facilities, administrative support, technical support and costs of purchasing computers

In this qualitative and quantitative study, I have explored the views and opinions of classroom teachers on the use of computers and the problems that inhibit effective utilization of the technology in their schools. A look at previous research findings on integration and use of computers in secondary schools from developed countries provided the basis for identifying if similar problems were also faced by teachers in my study.

2. REVIEW OF RELEVANT LITERATURE

Teacher Training

Research conducted in developed countries like America, Australia and Britain indicates that there are not many teachers qualified to use and integrate computers into teaching (Albion, 2000, Clark 2000, Counts and Drinkwater, 2000; and Parr, 1999). These scholars reported that most of Information technology teachers were not qualified in the subject and the quality of teaching computers was not up-to-date. Therefore, despite the pressure on teachers to increase the use of computers in education, progress towards integrating computers into the curriculum and subsequent use in the classroom remains limited (Abbott, 2000 and Young 2000).

Kay et. Al (1999) noted that teachers needed to be trained to change their role and responsibilities from the dispenser of knowledge to facilitators of knowledge acquisition to manager of information resources. Kay et.al (1999) identified the inadequacy of pre-service course program that hindered the effective utilization of educational technology in the classroom such as time, expertise, accessibility to equipment resources and support materials. These scholars were convinced that if properly trained, the power of technology lies in the teacher's ability to appropriately select, integrate and evaluate computer tools to support learning.

The success of integrating computers into education in developed and developing countries like Kenya depends strongly on how teachers have been prepared to use computers. Teachers are the backbone in any curriculum innovation. They have a central role in integrating computers in the school. Therefore they must be trained properly in the use and integration of computers



into the curriculum.

Thus, the inadequate training of teachers in the use of computers has been claimed to be a major factor affecting the integration and effective utilization of computers in teaching and learning. Many scholars have therefore argued that in order to integrate and use computers in the classroom, all teachers should be trained in their use (Clark, 2000, Cameroon 1999, Rannae and Troy 1999). A study by (Macro and Erler 1998) in England found that gaining experience and confidence, particularly in the use of computers and software was seen as the main deficit in the use of computers in schools. (Chiero 1997) found that lack of training was a problem frequently mentioned by teachers as the second highest obstacle to the integration of computers into teaching. Scheffler and Logan (1998) also noted “teachers’ lack of confident in their computer skills and their ability to integrate computers into classroom hampers effective computer implementation. Carol 1997) found that “teachers needed to be trained not only in the personal computing skills but in the practical application of the skills, for example in the classroom use, in planning and in preparing schemes of work.

Similarly, Abbot and Faris (2000:150) argued that the amount of computer experience provided to students during their training might affect the extent to which they will implement computers in their teaching. Kay, Caffarella, and Tharp, (1999) noted that teachers needed to be trained to change their role and responsibility from the “dispenser of knowledge acquisition to manager of information resources.” Kay et al. (1999) identified the inadequacy of pre-service course program that hindered the effective utilization of educational technology in the classroom such as time, expertise, accessibility to equipment, and computer support materials. Kay et al. (1999) were convinced that if properly trained, teachers’ ability to select, integrate and evaluate computers tools to support training. Stetson and Bagwell (1999) expressed similar sentiment.

Since hardware and software are changing rapidly, teachers need to be taught both computer skills and skills in designing and implementing curricular using computers. Tiene and Ingram(2001) report that as schools become wired and acquire a wide range of equipment, teachers will have to be able to make good use of e-mail, web browsers, data bases, spreadsheets, word processors etc. Teachers must gain new and improved skills in using these technologies. Teachers need to know how to integrate computer technologies into their teaching subjects. They must be conversant with hardware and software because computers have new capabilities and new requirements. For example, “new input and output devices such as scanners, cameras and printers will require set up, basic trouble shooting and competent use.” Heinich, Molenda, Russell and Smaldino (2002) feel that teachers need to be trained to understand that their role has changed from information presenter to learning resources coordinator, and to serve as facilitators, managers, counsellors and motivators. They believe that training will

enable teachers to learn that “their new role frees them to work more independently with individuals and small groups while computers do the formal lesson presentation.

3. TEACHER’S KNOWLEDGE AND SKILLS NEEDED FOR CURRICULUM INNOVATION

Teachers who implement curriculum innovation related to computers must possess sufficient knowledge and skills to teach computer literacy skills. Teachers must be competent to deliver the required knowledge. They have to be competent with the use of computers in order to teach students how to use and learn with computers. Therefore, knowledge and skills must be present for any technology innovation to be present for any technology innovation to take place effectively (Chiero, 1997, Carol 1997).

Opie and Katsu (2000) reporting from Britain noted the concern of the Department of Education and Employment(DFEE) to equip every newly qualified teacher with the knowledge, skills, and understanding to make decisions about when not to , and how to use computers effectively in teaching particular subjects. Dexter, Anderson & Becker (1998) also stressed that for teachers to implement any new instructional strategy, they must acquire new knowledge about computers and put this together with the demands of the curriculum, classroom management and existing instructional skills. Sandholtz (2001) gives an example of how teachers who acquired knowledge and skills of using computers led to increased levels of classroom implementations of computers as one teacher reported “ I was a nonuser of computers. Training one on computers took major effort. Now I can use one well enough for classroom use, as well as help students do essays” Another teacher said “ I gained a feeling of excitement and being capable. I gained a sense of accomplishment, a feeling that helped me try new ways to use technology. Consequently, teachers knowledge and skills facilitates the subsequent integration of computers into classroom instruction”

However, for teachers to make informed choices, Heinich, Molenda, Russell, and Smaldino (2002), stated that teachers need to be familiar with the various computers application games, simulations, tutorials, problem-solving programs, word processing, graphics tools, and integrated learning systems. Teachers can acquire new knowledge of computing skills through in-service courses, self instructional programmes, tutorials assistance and formal training. They also need encouragement to continue their professional development in computing.

4. ATTITUDES OF TEACHERS TOWARDS COMPUTERS IN EDUCATION

The success of any curriculum innovation



depends on the attitudes of teachers towards the implementation of the innovation in the classroom. Research has shown that the attitude of teachers towards computers in education is an important factor in the effective integration and use of computers in teaching and learning (Abas 1995 and Young 2000). Attitude has been defined by Anandra (1998) to encompass various relationships, from simple like and dislike of computers to complex attitude such as computer anxiety and apprehension. Therefore, one factor in the successful integration of computers in the school curriculum is teachers' acceptance of the new technology. Teachers' acceptance is believed to depend on their attitudes towards the technology, since decisions about whether and how to employ the technology in teaching and learning are heavily influenced by the teachers' views and attitudes and by their perceptions in motivating students to learn.

Furthermore, research has shown that teachers' attitudes about computers can positively or negatively influence their students' attitudes towards computers in education and that low users of computers tend to have more negative attitudes towards computers (Anandra 2000). Moreover, increasing amount of experience has been associated with positive attitudes towards computers (Abbot and Faris 2000). Similarly, research has indicated that attitude towards the use of computers is related to other attributes such as the relationships with gender. A study by Combre, Colley, Hargreaves and Dorin (1997) in Britain found that male students from both age group reported greater experience with computers and had more positive attitudes towards computers than female. Young (2000) reported similar findings in America. However, since attitudes can be modified or changed, it is expected that teachers and students may become more positive towards the use of computers once their attitudes are identified, and steps are taken to challenge these attitudes if necessary. Based on the above research findings, teachers could develop negative attitudes towards computers due to lack of experience with use of computers, lack of interest, and lack of support from school administration.

Lack of computers for teachers to use in teaching and learning

Teaching and learning materials required to enabled technology innovation to work should be easily available. In order to integrate computers into the school curriculum, there is need for all schools to have adequate supply of computers and other related resources. Without the hardware and software, it is impossible to implement changes that require such support and other teaching and learning materials. According to Mizukoshi, Kim and Lee (2000), resources are tools, and the support materials that are used to learn computer skills must be provided. These materials include computers, software, diskettes/flash discs, printer, teacher's guide notes, student's manuals and computer textbooks. Clark (2000) reported common research findings that 'teachers wanted more software and

equipment in their classrooms. Similarly, (Zammit 1992), found that the second most important factor that encourages teachers to start using computers was software availability. Therefore, based on the research findings from these scholars, it is apparent that provision of adequate computers in schools would definitely encourage teachers to use them.

However, it is difficult to define what might be necessary as an "adequate" level of computing equipment in a classroom because it will depend very much on how the computers are to be used by the teachers and students. If the teacher is going to use the computer to demonstrate things to students then one computer might be enough. If students are to work on the computer themselves, then may be they need one computer for each student. Certainly, when students are trying to learn how to use the computer (eg for word processing), it is very difficult if they do not each have a computer. Effective use of computers in teaching and learning in the classroom requires sufficient availability of computers. Research findings have indicated that lack of computers was a major barrier to the effective integration and use of computers in the classroom (Carol, 1997, Mellon 1999, Peggy, 1999 and Zammit 1992). A study by Ertmer, Addison, Lane, Ross and Woods (1999) confirmed that lack of computers was a barrier to the integration and use of computers in the classroom. Vannatta and Beyerbach (2000) found that technology infusion in the classroom was still difficult to implement in American schools because of inadequate computers and software. Teachers need enough computers for at least six to eight students to each computer. There is need for the stakeholders to plan and provide adequate funds to be set aside for the purchase of computers so that teachers and students could use them as required.

Accessibility to computers and resources for teaching and learning

Collins dictionary defines access as "the state or condition of being approachable or easy to enter" and the second one refers to access as the right or privilege to approach, reach, enter or make use of something." These definitions fit very well with the concept of "access" to computers meaning the opportunities afforded to all students and teachers to interact with computers and to the removal of barriers that might stand in the way of these opportunities being taken up. The issue of access to technology and software is vital in the effective utilization of computers into education. Clark (2000) and Millar (1997) noted that difficulties in access to computers. The issue of access to computers and software is vital in the effective utilization of have resulted in low level of computer utilization. In fact access to computers for integration and use in teaching and learning stands out prominently and remains a big challenge even in developed countries. Struddler 1996) also found out that lack of access to computers and software was a major impediment to computer integration.

However, given the relative high cost of



computers, access to the computer tends to favour wealthy schools and students. A study by Barron, Hargarty, Kromrey and Lenkway (1999) in Florida State in America (USA) shows exactly how rich countries can afford large number of computers. The study indicated that more computers were supplied to the schools to fight the high rate of crime and poor behaviour of students and each student had a computer to use at any time.

Therefore, the extent to which teachers and students can use computers in teaching and learning depends to a large extent upon how accessible the technology is to them when they want to use it with the students. Again, even if the computers were available to the teachers, there is also the issue of timetabling and booking the computer laboratory that has to be done in advance. Besides, Carol (1997) points out that access to computer does not just mean obtaining a computer, but it includes getting it and using it as required. Therefore, access to computers is a major issue in both developed and developing countries. The school can purchase many computers to support teaching, but if students cannot access the technology, all the investment is wasted (Bates2000). Thus, with easy access to resources and adequate information about them, teachers could be sufficiently motivated to use them, because access is also a function of the teachers' knowledge and the skills. A teacher could have several computers in the classroom, but if he/she does not know how to use them then the technology is not accessible.

Technical support for effective use of computers in schools

The issue of technical support and maintenance of educational technology equipment is one of the major factors militating against the integration of computers in the school curriculum especially in developing countries like Kenya. A decision to include computers in teaching and learning must consider whether the performance of the computers will be maintained under normal working conditions and whether the equipment is reliable or not. The problem posed by heat, humidity, dust and access to electricity to use computers are some of the problems faced by developing countries with lack of electrical power supply.

However, even in developed countries the issue of technical support and maintenance of computers have been reported by researchers. Veen (1996) reporting on the situation in Netherlands noted that the support of the technical assistant is essential for teachers. Veen (1996) believes that teachers count on the support of the technicians for tasks such as use of software and in collaborative work during the lesson in the laboratory. Carol (1997) found that the support provided by technical assistants were very valuable to teachers. Therefore, availability of technical support would be an ideal help for integration and use of computers in secondary schools in Nyanza province.

Availability of time to use computers in teaching and learning.

Researchers indicate that lack of time for teachers and students to use computers effectively in teaching and learning is another factor that affects the effective utilization of computers in the classroom (Andris, 1996; Chiero 1997 and Struddler 1996). Struddler (1996) reported that participants in his study complained of being burdened with teaching load, planning duties and other school work such that they had no time to learn, to keep up with and plan to use the new software. Chiero, (1997:138) found that 82% of the respondents in her study had no time to learn and use computers. Ertmer et al (1999) also pointed that time was a barrier that affected motivated teachers efforts to use computers in teaching and learning. Karen, (1999) and Struddler (1999) report similar findings.

Teachers must have time to implement the new technology. They need enough time to learn, adapt, integrate and reflect on what they do with students in the class. They need time to try things out, and reflect on their success and failures. They also need time to attend in-service courses, they need time to practice with new materials, and time to evaluate new teaching procedures and attend to their daily load (Carol 1997, Chiero 1997, Dawson 2000, Zammit 1992). A study by Dawson (2000) also found that teachers were list satisfied with time for the use of computers. Availability of time is very important for teachers to plan and work effectively with computers in teaching and learning.

Lack of support from the administration

Tily (2007) explained that the main factor affecting ICT application areas in a school was leadership. Teachers need to be encouraged to use computers in teaching /learning to improve the quality of education, and to motivate students and provide quality in lesson presentation. Administrative support for the implementation of computer technology has been reported as a major factor that determines the use of computers in teaching and learning. Principals leadership in school need to be focused and should influence on the allocation of resources to support management, mentoring performance, empowering staff, improving academic standard and displaying desirable behaviour in the school. A study by Guha (2003) revealed that there is a strong positive relationships between school support and ICT integration.

5. PHYSICAL FACILITIES

Provision of suitable facilities for effective use of computers has been reported by scholars (Parr 1999, Yee 2000). A study by Yee (2000) found that Principals of schools portrayed a passionate commitment to providing appropriate suitable rooms for computers and other ICT



equipment. Principals need to prepare rooms which are free from dust, damp and fitted with carpets.

The cost of using computers in schools

The cost of purchasing and operating computers in schools is the main reason why computers have not been widely used in developing countries like Kenya. Education Insight (2006), Okuoga, (2006) Wangari (2008) But even in America, a study by Clark (2000) found that lack of funds was one of the major factors affecting the integration and use of computers into teaching and learning. There have been a number of attempt to estimate the costs of using computers in teaching and learning. One such attempt by Scheffler and Logan (1998) concluded that the “cost for technology extend well beyond the purchase and installation of hardware and software.” Scheffler and Logan (1998) believe that technology training and professional development for teachers is part of the cost. According to them, the training programme must be an on going process, and this can be expected to require 30% or more of the school budget. They feel that “teacher preparation technology course should be based on competencies essential for designing, developing, delivering, managing and evaluating instruction” that will also require additional funding. In addition, the cost will also include purchase of textbooks, students manuals, teachers’ travel to and from in-service training centres, maintenance and repairs, electricity supply, teachers support materials, and recurrent expenditures.

Moreover, Carol (1997) studies in England found that funding for the integration of computers in teaching was a major issue particularly with the provision of commercial software that are not good value for money. Barron et al. (1999) report that a total of 4.8 billion was spent to integrate technology into K-12 schools in Florida State in USA. The issue of funding technology in education in developed and developing countries is a big problem because budgetary data are often inadequate for a detailed study of costs that sometimes could be immense. Therefore, the problem of expenditure on educational computing is not unique to one country, so schools need to find other sources of funding the integration and use of computers in addition to funding from the government.

6. RESEARCH METHODOLOGY

Research Design

Descriptive survey was used in this study. According to (Orodho 2003) descriptive survey design allows the researcher to gather information, summarize, present and interpret for the purpose of clarification. It is a method that helps in collecting information by interviewing or using questionnaire to a sample of individuals. Kothari (1995) noted that descriptive survey is concerned with describing, recording, analysing, and reporting conditions that exists or existed. I chose to use descriptive survey because it has the advantages of being

economical, and provides data that is easily analysed and for its appropriateness in educational research findings which produce accurate information.

The study area

The study was carried out in public secondary schools in Nyanza Province. It is one of the eight provinces in Kenya .It borders western province to the west, Rift valley to the North and Tanzania to the southern part of Lake Victoria. At the time of this study there were over 500 secondary schools both public and private.

Target Population

The study targeted 80 public secondary schools in Nyanza Province together with 80 computer teachers in both girls, boys and mixed secondary schools.

Sample and sampling procedure

The sampling unit was the school and saturated sampling was used for this study because these were the only schools using computers in teaching and learning.

Data collection instruments

I used semi-structured interview, questionnaire and observation schedule to collect data in this study (Mugenda and Mugenda 1999). The respondents were classroom teachers teaching computer education in public secondary schools in Nyanza Province. A total of 80 teachers took part in the interviews. The semi-structured interview method was appropriate because it enabled the researcher to use diverse range of techniques to collect data and analyse them both qualitatively and quantitatively. This included using tape-recording of in depth interviews and open-ended discussion to collect data.

The semi-structured interview examined problems and issues concerning teacher training in the use of computers, attitudes of teachers towards computers, availability of computers and software, and other support materials; accessibility of computers and materials for teaching and learning; technical support for effective use of computers in schools; time for using computers and cost of computers and software; individual characteristics such as gender, age, and teaching experience. Employing unscheduled probes during the interviews as noted by Bell (1993), Newman (1999), and Yin (1994), analysis of data was done as the first data was collected and continued throughout the study.

7. RESULTS

The results of the interviews indicated that the participants were secondary school teachers from public secondary schools. The data collected revealed that 44 (55% of the computer teachers were from rural schools



while 32(40%) were from urban schools and another 4 (5%) were from suburban schools.

The age (years) and gender distribution of the interviewees

The results obtained on this question indicated that out of the 80 participants who were interviewed, the majority (50%) were between 31-40 years. In the age bracket 41-50 there was only one female teacher. Overall, there were more male participants than female. Again, out of 80 interviewees, (65%) were male and (35%) were female. The number of years of teaching experience ranged from 1 to 20 years with an average of 5 years. The number of years of teaching experience using computers in teaching and learning in the classroom showed that rural teachers were the most experienced with a range of 0 to 6 years. There was no computer teacher without the knowledge of computer skills, although (45%) of them had a lot of experience with the use of computers.

8. FACTORS AFFECTING THE EFFECTIVE USE OF COMPUTERS IN SCHOOLS

All of the factors identified by the participants were analysed qualitatively and quantitatively as displayed in table 1.

Table 1: Factors affecting use of computers in schools

Comments	Participants	Percentages
High cost of compute and software	44	55%
Lack of teachers and students manuals	40	50%
Time not enough for all students to learn effectively	12	15%
Lack of suitable software for computer education	20	25%
Lack of relevant computer textbooks	28	35%
Lack of access to computers	12	15%
Teachers not adequately trained in computing	20	25%
Not enough space in computer lab/room	20	25%
Power backup not	32	40%

adequate		
Computer lessons not allocated on the timetable	24	30%
Lack of funds to purchase materials	44	55%
Lack of clear policy for classroom use of computers	80	100%

The responses from the interviewees indicated that lack of clear policy for the use of computer in teaching and learning was a major factor that hinders effective implementation of the technology in all schools. The high cost of computers and software another issue mentioned by more than half of the participants. A study by Wangari (2008) also reported high cost of equipment as the one of the major factors affecting use of ICT in schools. Lack of teachers and students' manuals were identified as important factors affecting the use of computers by the majority of the respondents. The problem of access to computers was reported by 50% of the interviewees. This was due to the fact that the number of computers available in the schools for teachers and students to use are few compare to the number of students. For example, in some schools there are 600 students with only 10 computers, so the problem of access is a serious issue. In addition some of the factors mentioned by the interviewees included lack of enough space in the computer room. This was in relation to the large number of students per class (sometimes 40-50 students per class) and this could not fit in a small computer room. However, one interesting point is that only two teachers indicated "lack of school policy for computer use" as a factor affecting their use of computers in the classroom.

Teacher Training in the use of computers

The major problem reported by teachers that affected effective use of computer was their lack of confidence and skills with computers despite in-service courses they attended. A large number of the interviewees were trained in computer skills for a very short period as can be seen in table 2

Table 2: Number of the interviewees trained in the use of computers

Period of training	Participants	Percentages
0-6 months	40	50%
Seven months – one year	20	25%



One year –two years	12	15%
2years and above	4	5%
No formal training	4	5%
Total	80	100%

The majority (50%) had attended a very short period of training in computer literacy. Further analysis of responses by areas indicated that most of the teachers from rural areas had been trained in the use of computers for less than one year during their teaching career, while a number of those from urban and suburban areas had been trained for more than one year.

In-service course attended by teachers on the use of computers

Many researchers (Clark 2000; Cameron 1999; Scheffler and Logan 1998) report that training of teachers in the use of computers should include in-service training courses. This will help to up-date teachers' professional qualification, increasing their knowledge on various educational issues and improving their classroom practices. However, the majority of the teachers 11 of 20 (55%) had not attended any in-service course on the use of computers compared to 9 of 20 (45%) who reported that they had attended any in-service courses. A similar research finding of lack of teacher training in the use of computers was reported by (Chiero 1997 and Carol 1997) from developed countries.

Teachers' attitudes towards the use of computers in teaching and learning

The attitude of teachers towards computer technology was considered an important factor in the effective use of computer programmes. The interviewees were asked to express their opinion by providing answers to either very positive, positive, and not positive. Their responses are displayed in table 3

Table 3: Teachers attitudes towards the use of computers in teaching

Rating	Number of teachers	Percentages
Very positive	32	40%
Positive	44	50%

attitude		
Negative attitude	4	10%
Total	80	100%

The responses shown in table 3 supports Anandra's (2000) study that teachers' attitudes about computers can positively or negatively influence their students attitudes towards computers in education and that low users of computers tend to have a more negative attitude towards computers.

SUMMARY

Several issues and problems that prevented the use of computers in the classroom were examined. The main problems were perceived as lack of adequate training in computer skills, not enough time for teachers and students to use computers effectively; lack of confidence and skills with computers; difficulties of access to the computers and software; lack of enough computers for students to use effectively and the issue of computer support materials, and technical assistance.

DISCUSSION

The use of computer-integrated education in secondary schools in Nyanza Province is relatively new. As such there are not many schools with computers, and there is no standard of what constitute effective teaching and learning with computers. An attempt has been made to highlight those problems and issues affecting teacher's use and integration of computers in teaching and learning. The list is not exhaustive, and only a few problems groupings have been discussed in relation to this study in Nyanza Province. The use and integration of computers in the classroom is strongly influenced and determined by the ability and skills of the teachers. Teachers have a responsibility to make decisions concerning pedagogical approaches consistence with their beliefs and their skills. Hence their preparation in advance in computer skills would greatly increase their use of computers in teaching and learning. However, studies revealed that most of the teachers even in developed countries have not been adequately trained in the use of computers education as part of their academic studies.

For computers to be used effectively in schools, the existing teacher training courses need to be built around developing teachers' personal skills in computer utilization. It is worth noting that the majority of teachers who participated in this research wanted more training in the use of computer as a tool for teaching and learning. Teachers will also need several training in different skills; as well as their attitudes towards the hardware ranging from those who are keen to those with negative attitudes,



those reluctant, indifferent; ignorant and those who are afraid of the technology and those opposed to change.

Another factor identified was the attitudes of teachers towards the use of computer-integrated education. No matter how advanced the techniques or methods were employed, only through positive attitudes of teachers could the benefits of computer education be realised. Negative attitude affects the use and integration of computers into curriculum instruction. Reports from the previous research reviewed indicated that the majority of teachers in secondary schools had a positive attitude towards the use of computers. Similarly, my own research findings reported (in section)also confirmed most teachers supported the use of computers in teaching and learning.

There are several difficulties regarding computers and software. The study has shown that the main constraints on the use of computers in schools are the inadequate supply of computers and software. Computers like books and other resources in the schools ought to be readily available sources of information for all students than belonging to office use only.

Teachers reported lack of relevant computer software for teaching and learning. Teachers complained that it was time consuming and frustrating for them to find out that software is not available in order to assess its quality. Moreover, educational software varies significantly not only in quality, price or applicability to Kenyan schools, but also in teaching and learning various subjects.

Time was another limiting factor reported by scholars as a barrier to effective use of computers. Teachers complained that in order to make good use of computers they need time to learn, time to plan ways of integrating computers into their class work and time to develop their expertise. Many teachers have had to invest substantial time and energy to develop their own computing skills, but it is inappropriate to expect teachers to undertake such fundamental and critical professional development issues completely in their own time.

Teachers need motivation that can make them approach teaching and learning with computers effectively. If teachers in this study are expected to continue using computers effectively in teaching they need to be motivated by allowing them time to research and use computers adequately in teaching and learning.

Adequate of funding can give teachers both the opportunity and time to practice, learn and assess the quality of programmes for use in teaching and learning. This study identified the cost of purchasing computers as another problem to the implementation and use of technology in schools. At the same time, accessibility of the hardware and software was also a very important factor reported by the interviewees as a major obstacle to the integration and use of computers in teaching and learning.

Nevertheless, most teachers feel that it is important for students to be computer literate. The research findings showed that schools are responsible for

the implementation of computers but the implementation of computers in teaching and learning depends on teachers receiving support from the administration, the school policy and physical facilities. These requirements need to be examined thoroughly.

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