

7.6. Problems and difficulties experienced by teachers with the use of computers

All of the interviewees who took part in the investigation were asked to state if they had come across any problems with the use of computers. This question was asked because numerous research sources reviewed in Chapter 3 Sections 3.4-3.11, suggest that teachers often face problems when they want to use computers in teaching and learning. The overall response from the interviewees indicated that most of them like to use computers in teaching and learning. But they also reported that there were some problems that prevent them from using the computers all the times whenever they would like to. Their comments were analyzed and displayed in Table 7.26

Table 7.26: Problems and difficulties that prevent teachers to use computers

| Responses from teachers | No of teachers | Percentage |
|-------------------------------------------------|----------------|------------|
| Time not enough for teaching students computers | 7 | 35% |
| Lack of enough computers and software | 4 | 20% |
| Lack of constant electricity supply | 3 | 15% |
| Lack of suitable computer rooms | 2 | 10% |
| Problem of eyesight due to constant use | 2 | 10% |
| Frequent breakdown and lose of programs | 1 | 5% |
| Maintenance of equipment | 1 | 5% |
| Total | 20 | 100% |

As can be seen from the table, the most common problem identified by the interviewees was lack of enough time for students and teachers to use computers. This was followed by lack of machines and software. The concern about time tallies to some extent with findings of Chiero (1997); Carol (1997); and Ertmer et al. (1999) discussed in Chapter 3 Section 3.7.

7.6.1 Factors affecting effective use of computers in the classroom

In order to establish why some teachers do not make use of computers effectively in teaching and learning, teachers who participated in the interviews were asked to list some of the practical and philosophical barriers to the use of computers. This question was asked in relation to a review of literature in Chapter 3 Sections 3.3. The responses from the interviewees were summarized and presented in Table 7.27.

Table 7.27: Factors affecting use of computers in the classroom

| Comments | Participants | Percentage |
|-------------------------------------------------------|--------------|------------|
| High cost of computers and software | 18 | 90% |
| Lack of teachers and students manuals | 16 | 80 % |
| Time not enough for all students to learn effectively | 15 | 75% |
| Lack of suitable software for CIE | 10 | 50 % |
| Lack of relevant computer textbooks | 10 | 50% |
| Lack of access to computers | 10 | 50% |
| Attack by virus | 8 | 40% |
| Teachers not adequately trained in computing | 6 | 30% |
| Not enough space in computer room | 6 | 30% |
| Power backup not adequate | 5 | 25% |
| Computer lessons not allocated on the timetable | 5 | 25 % |
| Lack of funds to purchase materials | 4 | 20% |
| Lack of clear policy for classroom use of computers | 2 | 10 % |

Teachers' responses to the first question as displayed in the above analysis showed that high cost of software and lack of teachers' and students' manuals were identified as important factors affecting the use of computers by the majority of the participants. Lack of time was another main issue mentioned by 75% of the interviewees; while the problem of access to computer technology 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 mentioned “lack of policy for computers use” as a factor affecting their use of computers in the classroom. As discussed in Chapter 5, there was no clear information regarding the implementation process of the computer policy contrary to what happened in the past with other curriculum innovation in Kenya. Because curriculum implementation in Kenya is highly centralized, these teachers expected a clear policy directive from the government on the implementation programme. But this problem could have been due to the fact that, “policy intentions are acceptable and that implementations is a matter of the technical ability and will of the implementing units, together with adequate resources. Any deviation or resistance of the policy messages is seen as irrational and a barrier to successful implementation” by the policy makers (Kgobe, 2000:7). So the schools were confronted with the translation of unclear policy into practice and the two teachers in my study identified this as a barrier to the use of computers in their schools.

7.6.2 Factors encouraging teachers’ decision to use computers in teaching

As indicated in section 7.6.1 the researcher investigated also a number of factors that influenced teachers’ decision to start using computers in teaching and learning. The question was asked to determine which factors had contributed to teachers’ use of computers in teaching and learning. The data obtained showed that the most important factors that encouraged the interviewees to use computers included the school policy, teachers’ initiatives and demand by the parents and students. Table 7.28 gives a clear picture of the contributions from the participants in the investigations.

Table 7.28: Factors that encourage teachers to use computers

| Comments from participants | Teachers | Percentage |
|--------------------------------------|----------|------------|
| The school policy | 15 | 75% |
| Teachers initiatives | 10 | 50% |
| Demands from students and parents | 10 | 50% |
| Availability and access to computers | 10 | 50% |
| Suitability of programs | 8 | 40% |
| Information from friends | 5 | 25% |

Analysis of the responses indicated that the school policy was the most important factor mentioned by 75% of the interviewees that encouraged them to start using computers. Availability of computers, access to computers and software was reported by 50% of the interviewees. But interestingly, teacher's self motivation to keep up to date with computer technology and the need for students to learn to use the computer also encouraged teachers to teach computer education. The parents' demand for their children to be taught computer was also cited by 50% of the interviewees in the case study.

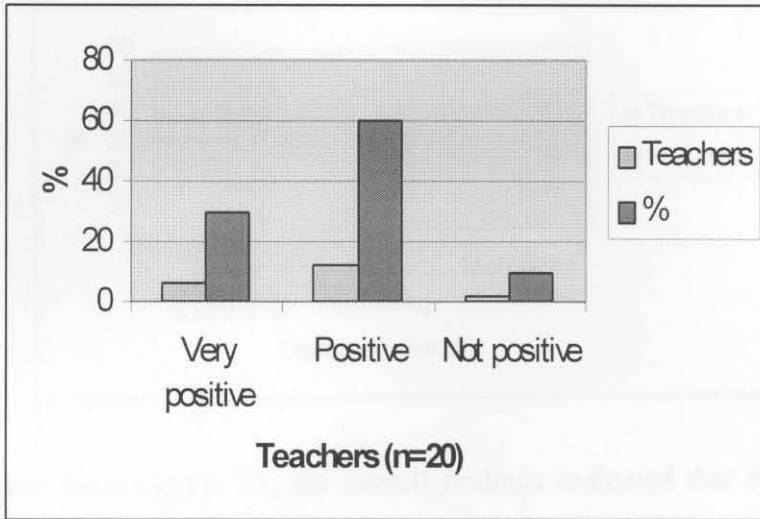
However, during the discussion with teachers from rural areas, one male teacher reported that he was encouraged to use computers by the school administration because "*the chairman of the school board is computer literate. He encouraged the school to introduce computers in the school and selected the programs.*" Another male teacher from an urban area also reported that "*the parents felt that the modern world is becoming computerized therefore the students should be brought to fit in it.*"

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

Another objective of the study was to investigate the attitude and views of teachers towards the use of computers in teaching and learning. The attitude of teachers towards the computer technology was considered an important factor in the effective use of computer programs. So the question about attitudes was asked to find out if the

interviewees valued the use of computers as a tool for teaching and learning. The participants were therefore asked to express their opinion by providing answers to the semi-structured questions and to provide reasons for such answers. The first question was aimed at investigating their attitudes. Figure 7.2 shows the responses from the interviewees.

Figure 7.2: Attitudes of teachers towards computer education in schools



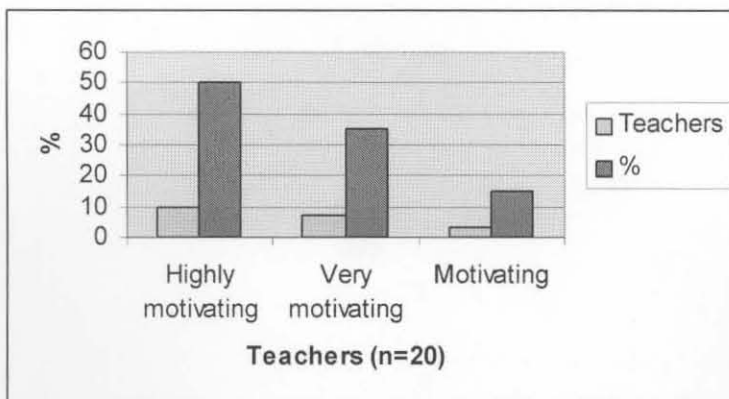
From figure 7.2, it can be seen that 6 of 20 (30%) interviewees had a very positive attitude towards the use of computers. This group comprised those teachers with advanced training in computer technology. Therefore they believed that computers introduce materials to the students that they had not learnt before. But 12 of 20 (60%) interviewee reported having a positive attitude towards the use of computer compared to 2 of 20 (10%) teachers who had a negative and were not interested in the computer subject. However, this group might not have had a negative attitude towards computers as such. I think they could have been suffering from fear of the computer technology as one female teacher from an urban area commented “ *Teachers generally have a phobia for computers. They do not assist the computer teacher to help shape the attitude of students towards the computer in the right direction.*” Responses to this question revealed that the majority of teachers interviewed believed that awareness of the benefits of the computer

as a tool for instruction influenced their attitudes to be more positive about the computers.

7.7.1 Views about computers motivating students to learn

Many scholars and authors such as Heinich et al. (2002) and Johnson (1995) found that motivational factors are indisputably important in education. If educators can find ways of creating more enduring fascination for all subjects taught in school then students could learn more effectively. The studies reviewed earlier have suggested that computers are very effective in providing learners with such motivation. If the students pay attention to and enjoy working with the computer, then the program may be regarded as effective as well as motivating. In this connection, all of the interviewees were asked about the effects of computers on students' motivation. The responses to this question were summarized and presented in Figure 7.3.

Figure 7.3: Rating of computers motivating students to learn



As can be seen from Figure 7.3, the overall findings indicated that the majority of the interviewees 10 of 20 (50%) believed that computers highly motivate students to learn and 7 of 20 (35%) interviewees rated the use of computers very motivating to students, while 3 of 20 (15%) rated it motivating. For example one teacher from a suburban school reported that the “*use of computers have really increased the students desire to learn. They are normally very motivated and this enables them to learn even more on the*

subject area.” Another teacher from a rural area said that “*in mathematics there are computer programs dealing with mathematics that motivate students, so any time they are free they ask me to allow them to go to the computer room to learn with computers on their own.*” Still another science teacher from an urban school noted that “*students are eager to respond to the computer. It has challenged them to search information from the Internet and they come and ask me what they learnt in science.*” The findings concur with previous studies by Carol (1997) and Christman et al.(1997) reviewed in Chapter 3 Sections 3.8. In conclusion, most of the teachers interviewed reported that computer programs are presented in simple and interesting manner. Some teachers noted that students are always excited and lively when it is time for computer lessons. They felt that computer programs are organized and involve more practical work linking with what has been covered by the class teachers in the class so the students are stimulated and encouraged to learn.

7.7.2 Views about the use of computers to increase students’ knowledge

One of the reasons for the use of computers in teaching and learning discussed in Chapter 2 was to increase students’ knowledge of various subjects. So the interviewees were asked to state their views about the capabilities of computer programs to increase students’ knowledge. The responses from the interviewees showed that all of them believed computers were effective in this respect. They noted that through the use of computers students have learnt and increased their scientific knowledge. The findings of a comparative study by Kiboss (2000:199) in Kenya indicated that students in the treatment groups learned the concepts and methods in physics better than their counterparts in the control group. The teachers in my case study confirmed, at least through their subjective judgements, that the use of computers increases students’ knowledge as summarized in Figure 7.4.

Figure 7.4: Teachers' rating of computers increasing students' subject knowledge

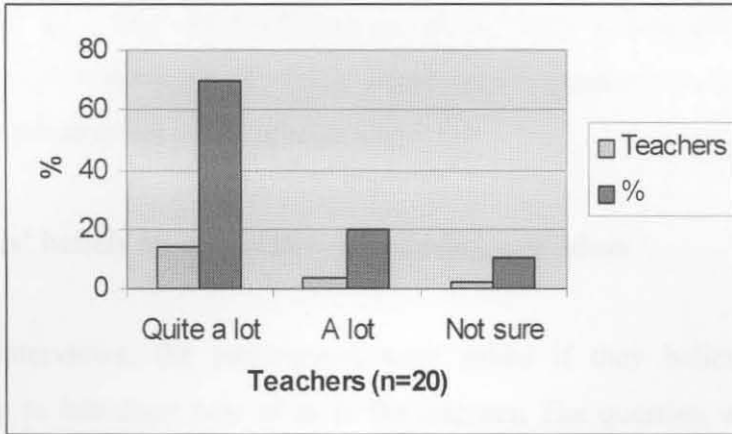


Figure 7.4 demonstrates that overwhelming majority 14 of 20 (70%) teachers believed that the use of computers helps to increase knowledge/information amongst students, but 2 of 20 (10%) were not sure. While 4 of 20 (20%) teachers reported that with use of the Internet, students access information on different subjects from various libraries or databases. As one male teacher from a rural school reported “*yes....it increases knowledge of English subject e.g when students access the thesaurus it gives them new words and alternative words so they learn new things.*” This helps to increase their knowledge of other subjects they learn in class. Christman and Badget (1999) and McCoy (1996) report similar findings.

7.7.3 Teachers' views about the use of computers to widen access to education

The interviewees were asked to give their views about whether computers were useful in widening access to education. All the participants responded positively, but gave different examples of the way it can expand access. The contributions are displayed in Table 7.29

Table 7.29: Responses on computer widening access to education

| Responses | Participants | Percentages |
|--------------------------------------------|--------------|-------------|
| It provides various educational programmes | 8 | 40% |
| It does not discriminate between learners | 4 | 20% |
| It provides distance education to students | 4 | 20% |
| Information reaches many through e-mail | 2 | 10% |
| It provides access to Internet | 2 | 10% |
| Total | 20 | 100% |

All the interviewees believed that the use of computers provides various kinds of learning for students who use it. The interviewees cited programs like spreadsheets that teach accounting, commerce and mathematics, thus reinforcing what the students learn in the class. Two of 20 (10%) believed that computers help to provide more information through the Internet and e-mail to many people thus widening access to education when they share the information and exchange ideas.

7.7.4 Teachers' beliefs on computers introducing new ideas

During the interviews, the participants were asked if they believed that computer programs help to introduce new ideas to the learners. The question was asked to obtain teachers' views regarding the contribution of computers to teaching and learning various skills. This includes learning traditional subjects and general knowledge of what happens in the world. Figure 7.5 displays the responses from the interviewees.

Figure 7.5: Views about computer introducing new ideas

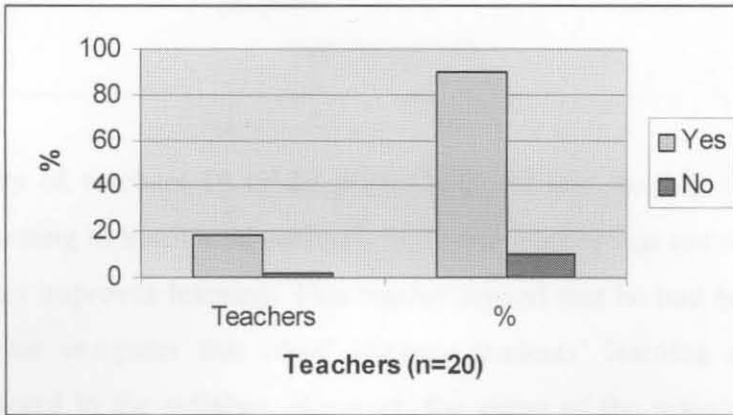


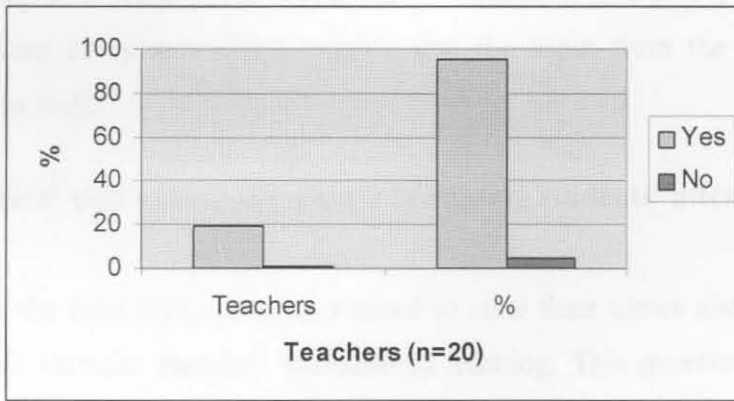
Figure 7.5 reveals that a high proportion of the interviewees 18 of 20 (90%) believed that computers introduce new ideas to teaching and learning. A few of them 2 of 20 (10%) gave a negative response, as this teacher reported “*it depends with what I teach. So I cannot say it introduces new things.*” However, the most common responses given by all those who answered positively was that both students and the teachers learn something new from computer programs. For example one interviewee reported that in “*computer new ideas come up every time when you access the help facilities of most programs. Most software and packages also have sample templates and wizards that help in learning new ways of finding things or solving problems e.g Resume Wizard in MS-Word.*” Another one said that in a subject like “*mathematics the computer helps me to teach statistics, graphs, square roots, cube roots, means etc.*”

7.7.5 Teachers’ views about computers improving learning traditional subjects

Scholars and authors (Ellington and Race, 1993; Heinich, et al. 2002) noted that most media can perform many teaching functions to a certain extent, although they may vary in their suitability for a particular purpose. Research studies conducted in developed countries (Carol, 1997, Pascoe, 1994) found that the use of a word processor helped to improve students’ learning of English language. Twenty participants in this study were asked to express their views about the use of computers to improve students learning and whether they could cite any specific examples when their students’ learning was

increased or enhanced by a computer program. A teacher of science reported that “*as a result of using computers students managed to pass their examination in mathematics, science, technical subjects and accounting.*” Another teacher noted that “*the students improved in Biology after I used a computer program because the computer gives vivid information that incorporates visual aids.*” Figure 7.6 shows the responses from the interviewees.

Figure 7.6: Views about computers improving learning of traditional subjects



The majority of teachers 19 of 20 (95%) believed that the use of computers helps to improve learning in traditional subjects. Only one teacher was not convinced that the use of computers improves learning. This teacher argued that he had not identified anything new from the computer that could improve students’ learning apart from the usual content covered in the syllabus. However, the views of the majority of teachers whose responses are contained in Figure 7.6 support the findings of Kiboss (2000:199) on the use of computers to learn physics that indicated significant improvements in pupils’ learning. Further analysis revealed the following responses in table 7.30.

Table 7.30: Teachers' views about computers improving learning in traditional Subjects

| Teachers responses | No of teachers | Percentage |
|----------------------------------------------------|----------------|------------|
| Students improve communication skills | 7 | 35% |
| Motivates students to learn new ideas | 5 | 25% |
| Computer programs helps students pass exams | 4 | 20% |
| Computer programs improve learning subjects topics | 3 | 15% |
| It has not helped them to improve learning | 1 | 5% |
| Total | 20 | 100% |

It is clear from the above table that an overwhelming majority of the interviewees believed that students learn from computers. It was very important to note that the interviewees held positive views that the use of computers has helped to improve students' communication skills. Other teachers believed that the use of computer programs improves learning specific subjects because the computer motivates students to learn. A few of the interviewees reported that the computer has helped many students to learn and pass examination. However, one of the participants pointed out that students do not learn from computers alone arguing that the input from the teacher needs to be considered as well.

7.7.6 Teachers' views about computers increasing students' attention to learning

Teachers in the case study were also asked to state their views about the importance of computers to increase students' attention to learning. This question was asked because from my experience, many students will pay attention to a lesson if they considered it interesting and presented vividly. Scholars such as Ertmer et al. (1999:65) have also found that computer programs can help to increase students' attention to learning. So in response to the question, the majority of the interviewees reported that students are more attentive when they are in the computer center learning with computers compared to

when they are in their usual classrooms. In fact most of them reported having fewer discipline problems during computer lessons. The responses were summarized and presented in Table 7.31.

Table 7.31: Teachers' views about computers increasing students' attention to learn

| Responses | Participants | Percentages |
|-----------|--------------|-------------|
| Yes | 17 | 85% |
| No | 3 | 15% |
| Total | 20 | 100% |

As indicated in Table 7.31, it is clear that the majority of the teachers 17 of 20 (85%) believed that using computers help to increase students' attention to learning. The interviewees who answered yes gave several justifications for their responses. For example, one teacher noted that *"in human anatomy the diagrams are so detailed and well drawn to attract the attention of the students."* Another one said *Yes...in Physics we teach electronics, this enables students to do practical experiments involving electricity without necessarily going to the conventional laboratory...it supplements the existing Physics curriculum."* Still another one commented *you see in science...especially Physics there are programs closely related to artificial intelligence which forms the basis of computer science."* However, a few of them 3 of 20 (15%) noted that the teachers must be with the students for them to be attentive to learning, otherwise some students will be talking or discussing and not paying attention.

7.7.7 Teachers' views about the computer improving communication skills

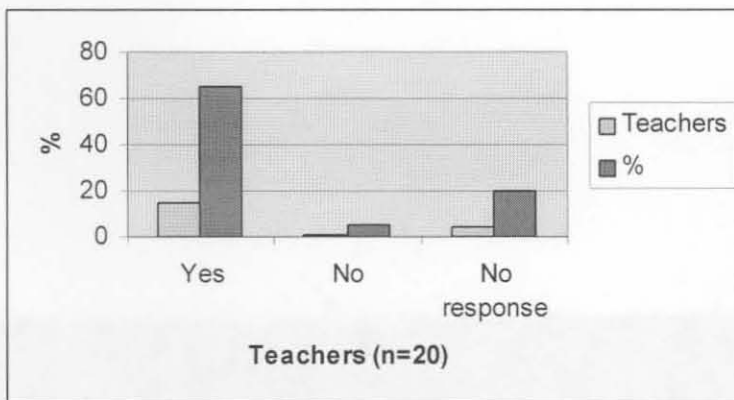
The other question on this theme concerned teachers' views about the use of computers to improve students' communication skills. This question was asked in relation to research findings by Zhang (2000:467) and Synder (1993:58) reviewed in Chapter 2 Section 2.9.6.4 that discussed the use of computers to help students improve writing, reading and composition work. The response from the interviewees indicated that 18 of 20 (90%)

teachers believed that the computer helped to teach students writing skills compared to only 2 of 20 (10%) interviewees who were not convinced that the use of computers could improve students' communication skills. However, one of the participants disclosed that his students "are able to write letters in German language after being exposed to the computer when they visited Austria." Another one reported that "when you use MS Word the computer indicates if you choose to use British English. It improves spelling, language structure and it exposes them to text to follow instructions. It has helped in learning English." A male teacher from a rural school also said, "since I started using computers and since in form three they (students) use MS Word their language has changed and this has widened their vocabulary." These findings tally with similar studies by Carol (1997) and Pasoce (1994) reported in Chapter 2.

7.7.8 Teachers' views about computers facilitating learning

Computers play an important role in providing assistance and additional information during problem solving activities. Computers have also become indispensable in correcting language errors and providing alternative solutions during facilitation of learning. Therefore, the interviewees were asked to state their views about computers facilitating students' learning. The findings are displayed in Figure 7.7.

Figure 7.7: Views about computer facilitating learning



Fifteen of 20 (65%) teachers from rural, urban and suburban areas believed that computers facilitate students' learning. Some of the teachers noted that computers provide students with immediate help and feedback so it makes learning easy for them. One of 20 (5%) did not believe that computers facilitate learning and four of 20 (20%) teachers declined to respond. However, in addition to this question, the interviewees were asked to express their views about the potential of computers to provide remedial work. The research findings indicated that (60%) of the interviewees responded positively, while (30%) was negative, but 10% of them did not respond to the question. Nevertheless, for the majority of the interviewees, the computer was an ideal medium for providing remedial work to students. As reported by one of teachers *"I usually put the notes in the computer so the students come to the computer room and read it. It is like you give them a handout and they learn from it. I believe it helps them to learn on their own."*

7.8 Teacher training in the use of computers

Another important area of investigation was training of teachers in computer literacy skills. A review of literature from developed countries (Clark, 2000 and Erler, 1998) indicated that teacher training in the use of computers was an essential factor in the integration and use of computer technology in teaching and learning. Teachers need to have confidence and the necessary skills in computers in order to disseminate the same information to students. All of the participants in the interviews were asked to state whether they have been trained in the use of computers during their teacher training courses or since computer education was introduced in their schools. Of the twenty interviewees, 19 of 20 (95%) confirmed that they had received some kind of training in computer literacy courses. Table 7.32 gives a clear picture of the position.

Table 7.32: Number of teachers trained in the use of computer

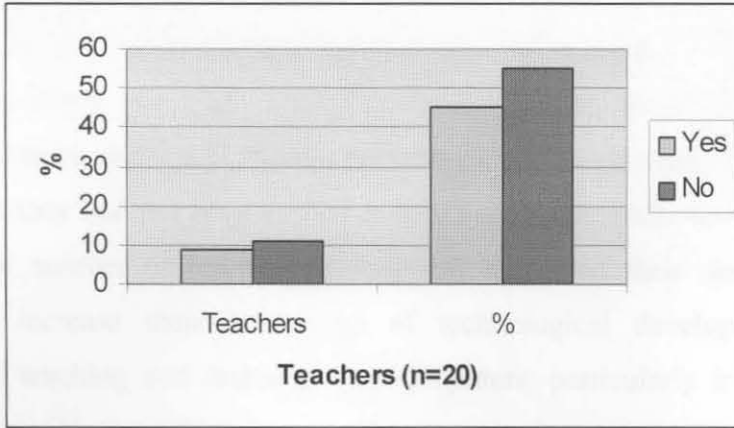
| Period of training | Participants | Percentage |
|------------------------|--------------|------------|
| 0-6months | 10 | 50% |
| Seven months –one year | 5 | 25% |
| One year-two years | 3 | 15% |
| 2 years and above | 1 | 5% |
| No formal training | 1 | 5% |
| Total | 20 | 100% |

From the above Table 7.32 it seems that the majority of the interviewees had a very short period of training in computer literacy since the introduction of computers in public schools. Only one reported having no formal training in computers but had acquired experience by practising from the school computers. However, some of the interviewees indicated that they had formal training at the university and at computer colleges. This group included a female who had MSc degree in information technology (IT), and the others had an advance diploma or had obtained certificates in computers. 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. However, looking at the urban and suburban areas, the finding indicated that all of them were trained for more than one year.

7.8.1 In-service courses attended by teachers on the use of computers

Several researchers (Clark, 2000; Cameroon, 1999; Scheffler and Logan, 1998) report that training of teachers in the use of computers should also include in-service training courses. This will serve the needs of all classroom teachers by up-dating their professional qualifications, increasing their knowledge on various educational issues and improving their classroom practices. All the interviewees were asked whether they have attended any in-service courses on the use of computers organized by the Ministry of Education. The responses are shown in Figure 7.8

Figure 7.8: In-service courses attended by computer teachers



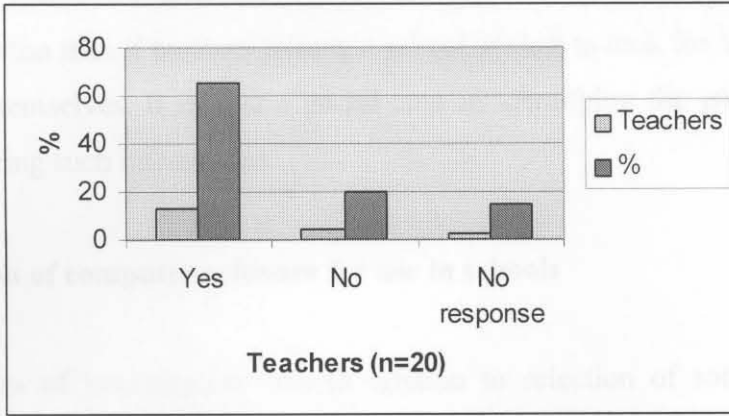
The majority of teachers 11 of 20 (55%) had not attended any in-service course on the use of computers compared to only 9 of 20 (45%) who reported that they had attended any in-service courses. A similar research finding of lack of teacher training in the use of computers was also reported by researchers like Chiero (1997:135) and Carol (1997:57) from developed countries reviewed in Chapter 3 Section 3.3.2. However, it is important that all teachers should be re-trained in any curriculum innovation. Such staff development courses contribute a great deal to teachers' professional development. Re-training programs for teachers also enable them to gain practical ideas about using computers in the classroom.

7.8.2 Workshops and seminars attended by computer teachers

A workshop or seminar for serving teachers designed to extend their professional capabilities is considered to be an important step towards effective use of computer technology in schools. During the workshop participants discuss and produce teaching and learning materials. However, the workshops and seminars that were available for teachers in my study were generally less than one week long and were conducted by computer companies in conjunction with the Ministry of Education. The computer teachers were asked whether they had attended any workshops or seminars on Computer

Education. Quite a large number of the interviewees reported that they had not attended any of the workshops or seminars as shown in Figure 7.9

Figure 7.9: Workshops and seminars attended by the interviewees

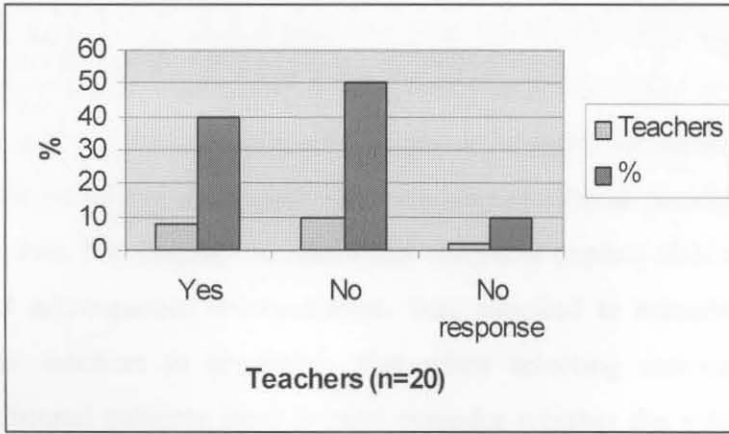


Thirteen of 20 (65%) teachers reported that they had attended workshops on teaching computer education, but 4 of 20 (20%) teachers in the study had not been to any workshop and three teachers (15%) did not respond to this question. Those who answered no stated that they had not been invited to take part in any such workshops or seminars. Quite a large number of teachers interviewed, registered their desire to attend such seminars to increase their knowledge of technological development and general awareness of teaching and learning with computers, particularly in the integration of computers into subject areas.

7.8.3 Induction courses for teachers on use of computers in their schools

The other item of investigation concerning training teachers in computers was induction courses. This question was considered important because beginning teachers and those transferred to other schools need to be inducted into the school system, so that they become familiar with facilities available in school for teaching and learning. Teachers in the case study were asked if they were inducted formally to the use of computers in their present schools. Figure 7.10 displays their reply.

Figure 7.10: Induction courses attended by computer teachers



The findings indicated that 8 of 20 (40%) teachers had a brief exposure to computers available in the school from the Principal. The other ten of 20 (50%) teachers reported that they learnt about the availability of computers in the school from fellow teachers, but 2 of 20 (10) of them did to respond to this question. It is important to emphasize the need to introduce teachers to new developments in the school. This is a more effective way of staff motivation than if teachers joining a school are left to look for facilities and teaching resources themselves. It is also a useful step in identifying the expertise of individual teachers during such interactions.

7.9 Selection of computer software for use in schools

Another area of investigation was in relation to selection of software. According to Heinich et al. (2002:64) there is a need to seek the help of a specialist who can give a better idea of the schools' needs when software is to be selected. This is important because there are various factors to be considered when selecting software for teaching and learning. Such factors include selecting software within the context of the learning outcome. There is also need to consider the content, format and ease of operation, design and completeness of the package (Heinich et al. 2000:229). Therefore, teachers who participated in the investigation were asked to indicate whether they selected the software they use in teaching computer skills. The findings are summarized in table 7.33.

Table 7.33: Teachers' responses on selection of computer software for use in schools

| Responses | No of Teachers | Percentage |
|--------------------------------------------------|----------------|------------|
| The computer teacher selected software | 12 | 60% |
| The Principal of the school selected software | 3 | 15% |
| Computer Experts selected software | 2 | 10% |
| Computer teacher and Principal selected software | 3 | 15% |
| Total | 20 | 100% |

Table 7.33 indicates that the majority of the teachers selected the software they use in teaching and learning. This seems to be quite appropriate because the computer teachers are the ones who are in a better position to determine the kind of program suitable for teaching which class as contained in the Secondary Computer Syllabus. However, in some of the schools the Principal of the school selected the software because most of them had been trained in computers and were also in a better position to select software. At the same time, the findings revealed that computer experts also took part in selecting software that accompanied the computers they supplied to schools. Nevertheless, it is important for teachers to remember that when selecting software to integrate into teaching traditional subjects there is need consider whether the software will match the curriculum, be clear, be accurate, be motivating and maintain learners' interest. Since the role of KIE is to develop curriculum materials used in schools and teacher training colleges below university education, to assess non-KIE publications to be used in schools the same would apply to computer materials. This requires KIE to recommend computer programs currently available for integration into different traditional subject and provide selection criteria for schools as they did with Secondary Computer Syllabus.

7.10 Teachers' suggestions on integrating computer programs into other subjects

The participants in this investigation were asked to state their opinion and suggest the subjects they think computers could be integrated for effective teaching. This question

was asked in relation to contributions on whole school integration reviewed in Chapter 2 Section 2.7 (Cornu, 1996). Cornu believed that only when computers are integrated into teaching and learning could their use become natural. Consequently, the interviewees suggested the subjects and topics into which they felt computers could be integrated as shown in table 7.34.

Table 7.34: Teachers' suggestions of subjects that requires CIE

| Identified Subjects | Suggested Topics |
|--------------------------------|-----------------------------------------------------------------------------|
| Mathematics | 3 dimensional, calculus, graphs, algebra, digital, trigonometry, statistics |
| Languages | All areas and Literature |
| Physics | Floatation etc |
| Kiswahili | Spelling, grammar, composition |
| English grammar | Comprehension, spelling, grammar and poetry |
| Arts, Drawing and Design | All topics |
| Biology | HIV awareness |
| Technical and Applied subjects | All topics |
| Home Science | Nutrition |

When the interviewees were asked to state how the integration should be done, they suggested that the teachers, computer experts and curriculum specialists should be involved in designing the programs. They felt that the teachers should be trained in the design of the packages to simplify it for students. One of them argued that *“teachers were in a better position to recommend the nature and depth of a particular program that is suitable to the students so they need to have an input in subject integration. They are on the ground, it would be easy and again for acceptability”* Another one said: *“the programs we have are so general in content that do not meet the needs of students in the curriculum, and will not do what we want.”* From these contributions, it seems that the teachers could identify a wide range of possibilities for integrating computers into the mainstream school subjects. However, they could also see that this would be a difficult and challenging task.

7.11 Teachers' recommendations for improvements to computer education in secondary schools

The last question in this investigation sought information on teachers' suggestions and recommendation for any improvement for effective use of computers in teaching and learning in schools. This question was considered to be very important because teachers are the ones implementing new curricula, and are at the grass root level to provide an insight into how computers could be used effectively. Therefore, in response to the question, the interviewees offered the following recommendations for action:

- **Government Policy:** There is immediate need for the government to identify computer firms to assemble cheap computers for schools so that all teachers could own computers and use the same to up grade skills in computer use.
- **Government Policy:** Teachers should be trained at the government cost on computer based learning approaches, and be certified so that the computer becomes an invaluable tool for teaching both secondary and primary schools.
- **The government** should remove the levy on school computers and related materials immediately so that schools could afford to purchase more computers.
- **In Universities and Teacher training colleges,** computer based learning approaches must be undertaken as an independent subject.
- **Kenya Institute of Education** As reported in Chapter 5 section 5.4 KIE is charged with responsibility to design curriculum for schools. So the interviewees suggested that KIE must design a curriculum that gives room for computer integration as opposed to their current approach where the learning process is assumed to involve only the teacher, student and their expensive textbooks. In other words, there should be a section of the book that directs the teacher to computer-based tasks.
- **Kiswahili language** can be promoted using the computer in the curriculum. Kiswahili teachers should be trained in software design or assisted to write interactive lessons that software designers can put to reality, so that we have interactive Kiswahili lessons on CD and other media.
- **All schools** with computers should be connected to the Internet.

- **For effective integration of computers** schools need to have enough computers to allow or enhance accessibility by all learners and the Secondary Computer Syllabus should explain how to use the computer in implementing the syllabus. This would enhance the use of computer technology.
- **All schools** should make their computing facilities available to the community in order to widen access and to promote the knowledge of computer technology to those willing to be computer literate
- **Curriculum specialists** should visit teachers more frequently to study their problems and suggest how these problems could be overcome.
- **More courses and seminars** should be organized during school holidays and teachers invited to attend so that they learn new concepts in computing. General computer awareness and simple maintenance and repair should be taught to all teachers in colleges so that when they are posted they have an idea on how to use the technology. Teachers also need a forum to discuss their fears and experiences with the new technology.
- **The number of computers** in schools should be increased so that the ratio of computers to students is at least 1:5, and rural electrification should be extended to all secondary schools.

7.12 Summary

This study of the use of computers among teachers in public secondary schools in Nyanza Province has revealed very useful facts concerning how computers are integrated into teaching and learning. While usage figures vary considerably from one teacher to the next, there were also differences in the way in which teachers used computers in teaching and learning. The results showed that, on average, schools allocated four or five periods per week for computer education classes. The majority of them were found to be making adequate use of computers in teaching and learning. In so doing the results revealed that computers are used mainly for the purpose of teaching computer literacy skills. This included teaching and learning word processing, spreadsheets, databases, basic programming and graphics.

In all the 20 schools in which interviews were conducted, the overall findings indicated that the computer programs used by the teachers to teach computer literacy skills were those in the syllabus produced at the Kenya Institute of Education (KIE). In addition, computers were also used for administrative duties such as keeping students' enrollment records, examination marks, and for general correspondence and communication purposes. The growing place of computers within the education circle in schools I visited in Nyanza Province has enabled most teachers to have the opportunity to use computers to analyze examination results in an organized manner. In this context, it was surprising to find that a considerable number of teachers were not integrating computers into their teaching subjects. However, the high profile given to computers in education displayed within the schools I visited, coupled with high levels of learners' expectations that the computer technology could play a major role in education, supported integrating computers into teaching and learning.

The results of the study suggested that teachers were positive about integrating computers into teaching and learning traditional subjects. Most of them reported that some of the computer software such as the spreadsheet links properly with some topics in mathematics subjects, commerce and accounts. Others noted that using a word processor can help students to improve their communication skills. Though many teachers were in the early stages of computer integration, some of them had overcome several major barriers and incorporated computers into teaching traditional subjects.

The other issue concerned students' knowledge of computer literacy skills. The overall findings as reported in Section 7.3.7 of this chapter indicated that in most of the schools, students were able to use the word processor to improve English language and to compose stories. Some of the schools taught students spreadsheet, database and basic programming. The present findings have also revealed that students generally learn with computers in a group of four or five, but sometimes they learn with the computers individually. Teachers also reported using computers for whole class teaching when explaining a point or teaching a new concept.

The computer teachers in the study were in agreement that computer education should be an integral component of teaching and learning. There were general positive views and opinions expressed by teachers on the potential of computers to motivate students to learn. Teachers' views and opinions appeared to directly influence the extent to which teachers use computers in teaching and learning. The overall finding showed that the majority of the interviewees regarded computer programs as very valuable, and believed that computer programs contain good learning materials, and presented it in stimulating and interesting manner that helps to introduce new ideas, widen access to education, and improve teaching and learning.

Another positive result of the study reported by the interviewees was benefits of using computers. All of the teachers believed that computers were beneficial to both the teacher and the students because they introduce a change in methods of instruction from theory to practical work. The computer also motivates students and breaks the boredom of classroom work. A study by Rudd (2001:219) noted similar findings. But further analysis revealed that the use of the computer does not provide students with an opportunity to interact or exchange ideas between the teacher and students compared to other methods of instruction.

In addition the interviews also elicited teachers responses regarding the impact of computers on students' learning. The findings indicated that students' interest during computer lessons was heightened and they were very lively, keen and eager to learn computer skills. Students recalled what they learnt from the computer program and were very attentive and concentrated very much on the machine to learn computer skills. Teachers reported also that after the computer lesson, students discussed what they learnt with their peers and consulted teachers on various points of the topics they learnt.

The research findings on the role of computers in schools revealed two major roles. The first role was to educate students in computer literacy skills, and to make the school community aware of the potentials of computers in education. The second role was for

administrative work, to keep school records, students' marks, official correspondence and communications including use of e-mail services.

The reasons for the different levels of computer usage among teachers were investigated. The reasons cited by the interviewees concerned mainly lack of appropriate software, lack of support materials, insufficient computers, lack of trained teachers in specific curriculum skills and classroom implementation strategies, and lack of enough time to use the computers in teaching and learning. As reported by Chiero (1997) and Pearson (2000), teachers need time to plan, research and use computers effectively. Some of the interviewees reported lack of power and the others experienced problems with inadequate software and lack of support materials. Some teachers were not able to use computers effectively due to these problems and limited access to software not available locally. Despite these problems, most of the interviewees were encouraged to use computers by the school administration.

The present findings have also shown that teachers were not adequately trained to integrate and use computers in teaching and learning. There is a need for a systematic teacher education program to enable all teachers to be computer literate. Although well-designed teacher training programs in computers may not necessarily lead to classroom implementation unless schools adopt specific plans to provide enough computers, it would be the right step towards 'whole' school integration of computers in education.

The issue of selection of software reported by the interviewees indicated that in some schools teachers selected software applications while in other schools the Principal selected programs. While in a few schools computer companies selected programs. Selection of software is an important issue discussed by Heinich et al. (2002:229) who noted the need to consider the format, content, ease of operation, accuracy, the design, completeness of the package, and learning outcome when selecting the software.

Despite the limitation of this current study in terms of small number of participants, the findings indicated that all teachers valued the use of computers in teaching and learning.

Although these teachers were convinced of the relevancy of computers, they could benefit more from full school integration of computers into subject teaching.

Common themes were evident in the teachers' suggestions for various ways to improve the use of computers in schools. High among their lists of needs included a clear government policy on the provision of computers to schools, teacher training in the use of computers, and the knowledge of curriculum issues in relation to computer education. Such suggestions as increased awareness and knowledge of software packages for integration were also cited. From these findings, it would appear that teachers would prefer computer programs with emphasis on subject integration. Therefore, 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. Lastly, it is worth to note one important limitation of this study. Teachers told what they were doing with computers but the researcher had no opportunity to observe directly what was happening in their classrooms.