Many computer users around the world have access to the latest advances in technology and use of the World Wide Web (WWW or Web). However, for a variety of political, economic, and social reasons, some peoples of the world do not have access to these resources. The educational systems of developing countries have not completely missed the technological revolution, but technology has yet to impact them in the ways it has the first world countries. Almost all the schools across the US are equipped with new instructional technologies. A closer look at developing countries, such as those in Africa, illustrates that technology has yet to be fully integrated into all education venues. In this article, the opinions of educators and their rationale for introducing technology into education in Kenya is reported. A large majority of the educators responding to a survey thought that computers would very much help their students learn, and 59% of the respondents reported that their school planned to buy computers in the next year. More extensive planning and development is recommended so that a nationwide training and purchase plan for providing computers in schools in Kenya and similar third world countries can be implemented.
Advances in technology that can convert unimaginable amounts of information into millions of digits and then back into text, creating sounds and images are instantaneously accessible to the wealthier countries of the world. Computer users around the world have access to the latest advances in technology. However, for a variety of political, economical, and social reasons, all peoples of the world do not have access to this information. The educational systems of developing countries have not completely missed the technological revolution, but technology has yet to impact them in the ways it has the first world countries. Research shows that because the United States is one of the leading technologically advanced countries, almost all the schools across the US are equipped with new instructional technologies. A closer look at developing countries, such as those in Africa, illustrates that technology is still a new phenomenon on that continent (Hawkridge, 1999). Before integrating technology into the educational systems of African countries, policy makers and educators need to thoroughly investigate whether assimilating new technology into the classrooms will be of any benefit. In this study, the researchers investigated the attitude and perception of Kenyan educators towards introducing technology into education in Kenya. In this article, the authors describe the potential positive and negative effects on the Kenyan educational system of technology integration. Researchers and policy makers need to take the next step in generalizing the results of this study to other third world countries.

STATEMENT OF THE RESEARCH TOPIC

Educational technology theorists, in debating the effects of technology on learning, have described the range of educational technology from textbooks to computer-based instruction as passive tools that deliver instruction but do not influence student achievement in any way. Still other theorists have claimed that the content and the way in which that information is presented to the students was the essential element in learning, not the medium through which the instruction is delivered. The authors of this article planned to learn whether Kenyan educators are aware of the profound influence that technology can have on student learning and achievement by sending a survey of attitudes towards technology to randomly selected educators in Kenya.
The survey used (Appendix B) inquired into the status of technology in the education system in Kenya in East Africa, the home country of the principal researcher. The survey was designed by the researchers to address the following research questions:

1. Do educators in Kenya believe that technology influences student learning?

2. What are the advantages and the disadvantages of computers as tools for teaching and student learning?

3. Can computer-based instruction improve the academic standards of students in Kenya?

4. What are some of the recommendations and future plans for Kenyan schools regarding the use of technology in classrooms?

The research questions are worthy of exploration because in the developed countries education professionals are integrating increasing amounts of emerging technologies into the delivery of information. However, because the world is becoming a global village, not just the educational systems in developed nations but all educational venues need to be equipped with the best practices in education. Technology has become a necessity for participating and competing in the global marketplace as well as in academia. Developing countries should not be left out of the technological revolution. Students in technologically advanced countries have had access to a vast store of multimedia that opens possibilities for intellectual discourse and connections across disciplines and geographic borders. This same access to information should not be denied to students in developing countries. Students in all countries of the world need to know the advances that are being made in other countries and become connected to the rest of the world. The fact that technology in its current and emerging manifestations will endure cannot be overlooked. Sooner or later, to meet global market demand, developing countries will become technologically advanced; public
education can be an important vehicle for preparing the citizens of developing nations for this change.

LIMITATIONS OF THE STUDY

Even though technology has a wide variety of tools to offer education, one limitation of this study is that the research questions focused on computer technology only. However, while other forms of technology and hypermedia have been used in education in the developed nations so most educators are familiar with them, this familiarity may not extend to some developing countries. Additionally, while this study focuses on Kenya, the findings cannot necessarily be used for generalization purposes when referring to other developing countries. Kenya could be classified as similar to other developing countries to some extent, but Kenya is not identical, and further research would amplify the strength of this study. Further, some Kenyan schools have already begun integrating technology into their classrooms so there is some familiarity with the benefits of technology in education among some of the survey respondents. More extensive research will need to be done on developing countries to draw broader generalizations.

REVIEW OF LITERATURE

Questions about educational technology and its effects on student learning have continued to surface as schools have entered the 21st century. Our world is really a global village, and the children are walking into it in profound ways (Shields, 1998). This phenomenon calls for a different kind of an educational foundation, one that cannot ignore technology. The purpose of this literature review is to bring into focus the use of technology in specific schools and further report the perceived effectiveness of technology in the education systems using the technology.

Most schools in developed nations have been adapting technology use in teaching either by choice or by necessity. Some researchers have argued that technology makes the process of education much easier for both the teacher and learner in the classroom, while others felt the use of technology contradicted the human role of the teacher. As a result of these issues, research has
been conducted to establish whether technology has an impact on student learning, important research if technology is to be integrated effectively into the curriculum. The results of such research will enable educators to focus on the future by planning and implementing an educational system that will be effective in preparing students for a technology based future.

In 1987 no clear consensus about the role, value, and effectiveness of technology use in schools in the US existed. Some critics argued that there was no research evidence to support claims that technology was worthwhile in schools while some reports offered pages of evidence of technology’s impact on schools (Salpeter, 1998). Peck and Dorricott (1994) wondered if removing all computers from schools would make a difference to the knowledge and skills students demonstrated upon graduation. Other research findings showed that technology was widely used in American schools (Peck & Dorricott). Along with the findings, these researchers identified several factors that prompted the use of technology, as well as the positive and negative impacts of technology on education. Peck and Dorricott found that new technology passed through three stages:

- The line of resistance into a ready market.
- Users of technology tried to improve or replace previous technology with the new technology.
- Users discovered new functions of the technology.

Peck and Dorricott (1994) found through contacts with other educators and attending educational technology conventions such as the National Educational Computing Conference (NECC) that most educators in the US had been using technology at the second stage for creating puzzles, delivering instruction, assessing student’s progress, and producing reports. According to Norton and Gonzales (1998) the responsibility for realizing the potentials of technology to improve educational practice was placed on the classroom teacher; however, the success of the integration of technology did not lie with the teacher alone. The authors observed further that teachers and educational reformer rarely recognize that innovative uses of technology required a revision of educational policy and practice if technology was going to have an impact on the education system.

Norton and Gonzales (1998) noted that using technology could change the way teachers teach. They further observed that technology supported more
Student-centered approaches to instruction so that students conducted their own inquiries and engaged in collaborative activities while the teacher assumed the role of facilitator. Peck and Dorricott (1994) have similar views about student learning. They suggested that since students learn and develop different rates, technology could help individualize instruction and, through an integrated system, students could move at an appropriate pace in a nonthreatening environment.

Bauschard and Osterhus (1998) found that computers gave learners the opportunity to create knowledge through new ways of looking at an old situation. Those authors encouraged teachers to view computers as learning tools with the potential to facilitate critical thinking, ensure the spontaneous creation of a new vision, and increase student learning, rather than as only productivity tools. Shields (1998) found that technology could be used in disciplines because it addressed what students learn cognitively and what they apply in terms of actual skills. Further, technology stretched across every dimension of academic life and, to a large degree, social life.

Peck and Dorricott (1994) stated that students must be proficient in accessing, evaluating, and communicating information. They found that educational technology provoked students to raise searching questions, enter debates, formulate opinions, and engage in problem solving and critical thinking. These essential skills could be developed and practiced through online tools, which enable students to gather information and then communicate their findings. In addition, Peck and Dorricott (1994) stated that technology fostered an increase in the quality and quantity of students’ thinking and writing because several features of word processing seemed to reduce the phobia associated with writing. New research indicates that people who use word processors to write do more re-writes, probably because of the ease of editing the work in a word processor. Technology, according to the findings, helped learners to solve complex problems. The productivity tools of educational technology engaged students in problem solving, quick test and retest solution strategies, and immediately displayed the results. Educational tools, including computer-based art forms, video productivity, and digital photography, helped nurture artistic expressions among students. Likewise, electronic media helped students instantly reach around the world, learning first hand information about other cultures.

According to Friedheim and Jaffee (1999), media changed the architecture of the classroom. Powerful search engines enabled students to access voluminous amounts of data, bringing unimagined experiences into the
classrooms. The Web and CD-ROM provided entree to galleries of images and sounds and to archives of scholarly data curated by diverse organizations such as museums, universities, National Archives and Records Administration, and the Library of Congress. The authors further stated that electronic discussions extended classroom space, pushed dialogue into the hours beyond the actual scheduled class meeting, and encouraged those sitting on the edges of a conversation to move closer to the front.

**IMPACTS OF MODERN TECHNOLOGY ON EDUCATION**

In the past few years, governments in developed countries have spent an increasing amount of money to integrate technology into K-12 schools. Given the amount of money expended, it is natural for taxpayers in the US to ask whether the increased spending is having a positive effect on students. While the literature regarding the impact of technology in education is extensive, it is not conclusive. Several studies have investigated the effects of technology on academic improvement, as measured by the standardized tests, while others have focused on such issues as school climate, motivation of students, and promoting student creativity (Barron, Hogarty, & Kromrey 1999).

Chopra (1994) found that most teachers had much to say about the positive impact of technology on education. In Chopra’s study, one teacher said that technology was the best thing that ever happened to instructional programs. A second grade teacher said that technology, especially the computer, kept the attention of a hyperactive student for more than a few seconds. A fifth grade teacher stated that students scored higher than before on standardized tests as a result of the use of technology.

Peck and Dorricott (1994) stated that technology fosters an increase in the quality and quantity of students’ thinking and writing. They further observed that writing on the computer made it easier for students to take creative and grammatical risks. Editing and revising could occur almost as quickly as one thought, and finished products printed from word processors had professional quality that generated a sense of accomplishment. Chopra (1994) also reported that when evaluating writing skills, the papers of students using computers were found to be neat and clean, with a well-organized format. Salpeter (1994) also found a remarkable improvement in writing fluency.
when students were able to compose at the computer. Students using the word processor were more engaged and wrote more per minute. As students became more fluent, the type and number of different words used increased, so with time the vocabulary of these students became more descriptive. These researchers concluded that the use of computers has contributed positively to students’ writing skills.

Christensen (1995) expressed similar views that students improved their writing and reading skills significantly as a result of the word processing program on the computer. Kozma (1994) observed that processing capabilities of computer technology enabled information to be displayed, received, stored, retrieved, organized, translated, transformed, and evaluated, among other processes. Means and Olson (1994) noted that technology is a valuable tool in schools where reformers were pushing for multidisciplinary projects, cooperative learning groups, flexible scheduling, and authentic assessment. Further, technology had the power to support students and teachers in obtaining, organizing, manipulating, and displaying information.

Students learned to solve complex problems as a result of computer technology (Peck & Dorricott 1994). These researchers stated that students developed these skills by themselves with minimal guidance from the teacher. They also found that a collection of computer applications called productivity tools could revolutionize the way students work and think. Databases, spreadsheets, computer-assisted design, graphic programs, and multimedia authoring programs allowed students to independently organize, analyze, interpret, develop, and evaluate their own work. These tools engaged students in focused problem solving, allowing them to think through what they wanted to accomplish. Kozma (1994) stated that with technology, students could identify needed information and detach it from a context, an important component of learning to solve problems. Further, this ability contributed to successful transfer and performance in subsequent real world situations. Means and Olson (1994) said that technology amplified what teachers were able to do with students and what they expected from the students. Technology also provided an entree point to content areas that might have been otherwise inaccessible until much later in an academic career, such as accessibility of word processors to first grade students. Likewise, computer technology extended and enhanced what students were able to produce in writing a report or graphing data. Additionally, students took great pride in using the same tools as professionals.
Peck and Dorricott (1994) observed that technological tools allowed students to inexpensively and instantly reach around the world, learning first hand about other cultures. Various technologies provided up to date maps and demographic data, while computer-based wire services brought a newsroom quality stream of current events into school. Norton and Gonzales (1998) stated that technology was a powerful tool responsive to students’ prior knowledge and experience, building connections to the outside world. Friedheim and Jaffee (1999) observed that simple pieces of software like a CD-ROM or a web browser put students in the center of a vast store of multimedia and primary sources that opened possibilities for intellectual discourse and connections across disciplines and geographical borders and classrooms.

Distance education technologies brought important learning experiences to students even in districts where small student population made some courses impossible to offer (Peck & Dorricott, 1994). According to Lewis, Treves, and Shaindlin (1997), although the flow of virtual classroom dialogue appeared difficult to predict and control, the benefit of the electronic courses was that they were student-centered. Further, technology encouraged collaborative and flexible interactions between faculty and students and among students, and allowed for exploration of a subject across different levels. The authors further observed that, in line with the needs of students who participated from computers across the world, online instruction supported a posterior view of the curriculum, one that recognized education as built through a series of experiences designed with students in mind. Christensen (1995) stated that students learned to be independent and self-directed learners as a result of using computers as a learning tool. Norton and Gonzales (1998) noted that technology-using learning environments promoted a shift from conventional teacher-student dialogue to complex and interactive learning environments. Further, researchers noted a shift from teacher-directed learning to student-centered learning but none were in use in government primary or secondary schools. Many of the computers in private schools came as part of external aid, paid for by donor agencies, which provided software and some staff training. However, such aid may not continue, leaving the schools with expensive computers they cannot afford to run (Hawkridge, 1991).

John (1998) observed that computer experts have envisaged a wide range of benefits for developing countries based on computer use. He also pointed out that even in developing countries more and more people need to use
computers. The growing numbers of people in urban areas emphasized the need for better records and more efficient service to the people of all countries. The lack of supporting infrastructure is evident in areas highly dependent on computers and computer-related technologies in developing countries.

John (1998) asserted that the magic words in the educational world today were technology and problem solving. Leaders who came from less technologically developed countries needed to use the best communication systems possible if they were to participate in solving universal problems. The author pointed out that electricity from the Kenya Power and Lighting was crucial to technology development and necessary to achieve the goal of computer literacy for all students. Buchmann (1999) recommended that by diversifying the curriculum and encouraging education for self-employment, the 8-4-4 system of education in Kenya could begin the process of reshaping formal education to suit the emerging needs of the country. Over a decade later, however, the initiative appeared to have been introduced too rapidly and without adequate resources to forge the desired relationship between education and the economy. This author pointed out that the ministry of education continued to adjust the program to achieve the goal of self-reliance. These efforts offer the possibility of building an educational system that truly suits the needs of Kenya’s people. The near future will reveal whether, against the odds, the Kenyan state can make choices to adopt and enforce policies conducive to the long term economic and social development of the nation. If the Kenyan state can stay the course of recent educational reforms, the authors expect that other fragile states can do the same (Buchmann, 1999). According to Hawkridge (1991), some educators surveyed in Kenya held the view that children need to learn about programming, while other teachers believed there is a need to know how to use computer programs for accounting, graphics, word processing, and so forth. A general feeling existed that if children of the developed world can learn to use computers, so must the children in Kenya to stay abreast of new developments. Hawkridge concluded that the future of computers in Kenyan schools was far from assured. Despite burgeoning economic growth in Kenya in recent years, expenditure on education was not likely to expand sufficiently to allow for a full government-funded program placing computers into all secondary schools or even a majority of them.
EQUIPPING TEACHERS WITH TECHNOLOGY

The responsibility of realizing the potential of technology to improve educational practice has been frequently placed on the classroom teacher (Norton & Gonzales 1998). These authors noted that the integration of technology did not lie with the classroom teacher alone, but that difficulties in integrating technology centered on the inadequacy of traditional teaching models that had existed for decades. Tremendous efforts were exerted putting computers in classrooms across America with little focus on training teachers to use them. According to the authors, a substantial number of teachers reported that they did not use computers and other technologies regularly for instruction because a majority felt they were inadequately prepared to use technology resources, particularly computer-based technologies. Even though using technology could change the way teachers taught, teachers lacked understanding of curricular uses of technology and were unaware of the resources technology could offer them as Professionals in carrying out many aspects of their Jobs.

Designing professional development could help teachers move beyond mechanical use of curriculum and technology to become facilitators of inquiry. Norton and Gonzales (1998) noted that helping teachers use technology effectively would be the most important step in assuring that current and future investments in technology were realized. As more and more teachers became trained in effective technology integration, some of these teachers, in turn, became trainers within the program.

Objectives of Teacher Training

Based on previous research, technology may improve students’ academic achievement in Kenya as teachers apply different methods of teaching and implement new technology skills in the classroom. For example, the use of computers in the classroom could help social studies teachers and students find information from the Internet about different countries, political systems, and cultural, and religious beliefs from anywhere in the world, helping students learn to coexist in a multicultural environment. If Kenyan educators and policy makers expect today’s students to be tomorrow’s leaders and voters who make intelligent decisions, the students must have literacy in global issues. The most effective and complete way of learning
about global issues is through guided use of the Internet by thoroughly prepared teachers.

Teachers will be able to reflect and make sound decisions about how technology is to be used in the classroom. For example, they will be able to implement the findings of the research on technology to develop new and appropriate classroom learning experiences. Teachers will be able to develop cross-disciplinary lessons and units that incorporate the use of technology. Educators need to be able to identify all the available and useful technological resources such as use of hypermedia, television, video resources, as well as computers, to support curriculum objectives. Administrators and teachers also need to implement commitment to using technology in the classroom as well as offer assistance and options for students, linked to their current computer expertise. Last, educators need to collaborate on effective technology use and provide for the adoption and the maintenance of the technology related curriculum decisions.

Salpeter (1998) suggested that an intelligent look at the research provided a more complex response than a “thumbs up” or “thumbs down” answer on the use of technology in schools. While the use of technology improved test skills, writing skills, and the way of thinking by students, teachers were more comfortable with the human role they were accustomed to playing without the interference of machines. These teachers posed the question “Could technology replace teachers?” While some routine tasks could be assigned to technology, only teachers motivate students and meet their emotional needs (Peck & Dorricott, 1994). Further, Mellon (1999) observed that for technology-based learning to be effective, teachers must select materials that help meet carefully defined instructional objectives, integrating these materials into learning experiences that motivate and excite learners.

The integration of technology will only make a significant contribution to learning in schools if the application was designed into complex social and cultural environments of learning (Kozma, 1994). According to Shields (1998), the real currency of the future for children is going to be whether or not these students can access information and use it to make a living; if not they will be forever marginalized. The author further observed that to leave students unequipped to move into a world driven by powerful tools owned by powerful corporations leaving students not knowing how to use or how to access those tools becomes a moral outrage. Teachers need to be the driving force to ensure that students are on the road to success in the workplace of the 21st century (Christensen, 1995).
Norton and Gonzales (1998) noted that educational change and the role teachers and technology could have in support of change is an arduous process. These authors suggested workshops should be offered to in-service teachers focusing on awareness, planning, implementation, and reflection as educators move towards making technology an integrated part of learning.

In summary, this research indicated that positive impacts appeared to outweigh the negative impacts of technology and substantiate the perceptions that more technology is needed, therefore creating greater opportunities for use of technology in schools in Kenya and other emerging countries. Technology can play an important role in the education system whereby students are the stars and teachers are the directors in reshaping education for the future.

CURRENT SURVEY OF TECHNOLOGY IN KENYAN SCHOOLS

Kenya is divided into seven provinces and one area*: Central, Coast, Eastern, North Eastern, Nyanza, Rift Valley, Western, and Nairobi Area* each with approximately 300-400 primary and secondary schools. While some provinces have less than 100 schools depending on the population, others, especially where the population is concentrated in cities, have up to 800 schools. The population sample for this study reflected the census of each province, using a random selection of schools with a target of at least 50% of schools in each province.

For the purposes of this study, the researchers planned a survey of technology goals and needs in schools in Kenya. Questions were constructed around the purpose of the study. The survey was mailed with a cover letter with information about the first and second authors and a statement of confidentiality. Respondents signed their surveys in agreement with the researchers’ using their information for reporting purposes. The cover letter (Appendix B) explained the purpose of the research. The letter concluded by giving the ultimate purpose of the whole study, to collect information that would suggest possible ways of equipping Kenyan schools with computer technology. In this way the respondents were encouraged to provide any additional opinions they might want to contribute.

The survey collected demographic data, some of which was optional, including the names of participants and positions in their respective schools.
The envelopes were addressed to principals or headmasters/headmistresses. Their return mailing address was made optional so that those willing to have the results mailed back to them would provide their addresses. Some information, however, was required; for example, the names and the province in which the schools were located, to determine which among the schools were primary schools, which were secondary or postsecondary diploma training institutes and what percentage responded to the survey from each province.

The next part of the survey addressed the purpose of the research: to determine if the respondents think technology is effective in an educational setting and to what extent it is used or not used in Kenyan schools. Some questions therefore addressed the technological background of the participants and their schools.

The researchers used peer review of the questions on the survey to ascertain that the questions were objective, respectful, and were easy to understand. The survey was then mailed to randomly selected schools in each of the eight geographical districts in Kenya. The researchers’ goals were to send out the survey to at least 30% of schools from each province. Self-addressed stamped envelopes were enclosed in the survey to facilitate the participants’ return of the survey.

Given the geographical remoteness of Kenya from the US, and problems with mail availability and delivery, it is not surprising that the survey took extensive time to reach the participants. The researchers allowed five months for mailing, completing, and returning the survey. The percentage of return of results of the survey depended on not only the participants’ willingness to fill out the survey and send it back, but on how effective the postal service in Kenya was in getting mail returned to the United States.

**DATA ANALYSIS**

The results of the survey were organized into secondary and primary schools because the review of literature revealed that different opinions existed on whether computers should be introduced at the primary or secondary level of education. Our research reveals that at least most of the respondents considered equipping secondary schools with computer technology was
important but most did not consider it as important to similarly equip primary schools.

A descriptive method of analysis was used in this project. All the responses to open-ended questions were compared and interpreted by the researchers to enhance the analysis. The following reports the analysis based on percentages.

In response to the first question in the survey, 41% of the respondents were not familiar at all with computer technology while 53% were somewhat familiar, meaning that they had used it for e-mail, letter writing or the World Wide Web. Question 2 in the survey aimed at finding if schools had computers and if so how many. Fifty-one percent (51%) of the respondents had computers in their schools and the total number of computers owned by the 51% respondents was 35 altogether. Asked whether their schools planned to buy computers, 88% answered yes.

Fifty-nine percent (59%) of these respondents planned to buy computers in the next year, 12% planned to buy in the next two years, while the remaining 11% did not plan to buy computers at all. In response to what extent they thought that having computers would help their students learn. Ninety-four (94%) thought computers would help their students learn very much, while 6% thought computers would help very little.

According to the respondents, the advantages of having computers for teaching and learning were as follows:

1. 88% thought that having computers offered a variety of sources for learning;
2. 52% thought computers were a way to help students become more independent of the teachers;
3. 29% thought that computers were a way to teach students to be more responsible.
4. 71% thought computers were a way to have students interact with people from other parts of the world;
5. 88% responded that computers helped students keep up to date with
current knowledge, I) 94% thought that computers were a support for teachers in record keeping; and

5. 17% of the respondents gave varied answers; for example, computers were efficient for storage of administrative information, they could be used for games and self-innovation, and students could do their own research with help of computers.

Table 1 gives the responses to the open-ended question of how the respondents would justify to the government the purchase of computers for their schools.

**Table 1**
Respondents’ Comments in Open-Ended Question 6

<table>
<thead>
<tr>
<th>Respondent Comment</th>
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<tbody>
<tr>
<td>Respondents would maximize computer utilization in teaching and management.</td>
</tr>
<tr>
<td>Since the whole world was becoming computer-literate, Kenya could not afford to be isolated.</td>
</tr>
<tr>
<td>Computers offered more learning at lower costs.</td>
</tr>
<tr>
<td>The labor market all over the world required persons with computer skills.</td>
</tr>
<tr>
<td>Computers create international awareness, a spirit of cooperation, and understanding between people of different nations</td>
</tr>
<tr>
<td>The government could appeal to donors on behalf of the schools for assistance in equipping schools with computers.</td>
</tr>
<tr>
<td>Computers would assist in achieving industrialization much easily</td>
</tr>
<tr>
<td>Computers made learning more exciting.</td>
</tr>
</tbody>
</table>

**ANALYSIS AND RECOMMENDATIONS FOR FURTHER ACTION**

Forty-five surveys were mailed to Kenyan schools in May, and by August, only 19 surveys had been returned. The return rate for this survey was 42.2%. Various reasons contributed to the low return rate, among them distance, as some parts of Kenya are remote and receive mail only weekly. Some surveys may not have reached their designated places due to a variety of other reasons. The general knowledge level, awareness and interest among the survey recipients in Kenya could be another factor affecting the
return of the surveys. Further, because Kenya’s economy in most respects is not thriving, some people may not have had the hope of effecting the recovery of the economy very soon, so that schools can be equipped with computers, and therefore did not see the importance of returning the survey.

The authors believed that people who did respond were self-selected because they were more likely to have a strong opinion either for or against use of computers in schools and a more optimistic attitude towards the possibility of obtaining computers in their school. Further, the time frame of three months might have been too short for the participants to fill out and mail the surveys back. The participants, in most cases principals, are very busy people, especially at the end of the school year and may not have had time to fill out the surveys. Further research should plan to send the survey in September with a deadline for returning in the following January.

The return rate, however, did not discourage the researchers from analyzing the results. Because the responses were from people truly committed to improving the Kenyan education system, the authors could not discard their opinions as expressed in the surveys. The strongest sense the authors got from the responses is that among the Kenyan educators (94%) who responded, most realize that computers can help their students learn more and more relevant information. To give such strong recommendations takes educators whose devotion to their students and their country generally is high. It was apparent to the authors that improving the Kenyan education system is at the heart of the respondents who spoke for their schools. However, the authors disagree with the feelings expressed by one of the respondents who thought that the government had nothing to do with how much has been done to equip schools with computers. The authors recommend that the government of Kenya appeal for assistance by presenting the situation in Kenyan schools to the World Bank, IMF, a benevolent foundation or donor agencies for help. The help would be proposed in terms of donating computers or giving monetary funds to help equip Kenyan schools with computer technology and to provide training and support for the teachers. Recommendations to the United States Peace Corps agency to place computer capable educators in Kenya’s newly computer enhanced schools can be a source of important on-site, timely training.

Further, studies must be done in this field in the future to be able to draw stronger conclusions about technology in the Kenyan education system. Ascertaining the level of knowledge of educational technology of Kenyan
educators will enable the design of a sound professional development program. Training is imperative in effective use of educational technology in schools. The goal of this study was to emphasize that computer technology is perceived to be an effective educational tool by educators in Kenya, and to find to what extent Kenyan schools were equipped or not equipped with computer technology. Moreover, the survey was designed to clarify and address some concerns of Kenyan educators about computer technology, in order make future implementation more effective.

The authors realize that the leaders in education in Kenya are concerned about the status of technology in their schools, and want to see their students have access to learning computer technology that can empower them in the 21st century. However, experience with workshops for teachers in the USA demonstrates that teachers must be prepared to use that technology effectively before computers can be placed in schools in Kenya. One model that can be useful for the important issue of staff development is the use of Technology for Teaching and Learning (TTL) academies in South Dakota (http://ttl.tie.net), which promote computer and technology literacy for all classroom teachers K-12 in South Dakota, a concept developed by the governor of South Dakota in spring of 1998. TTL academies include four weeks of intensive hands-on learning with development of lesson plans and classroom activities that integrate technology. This exemplary use of thorough staff development plans, including some simple trouble shooting training, can help teachers be an important force in integrating and using computers effectively in schools in Kenya. Many teachers involved in these workshops had little or no previous experience in training or use of educational computer applications, similar to the status of educators in Kenya at the time of our survey.

According to Hawkridge, (1991) despite the strong economic growth in Kenya, expenditure on education was not likely to expand sufficiently to allow for a full government-funded program to put computers into all secondary schools or even a majority of them. Having summarized results of the survey, the researchers plan to mail a copy of the results including suggestions from participants, to the ministry of education in Kenya with the intention of effecting the ultimate goal of equipping Kenyan schools with modern technology. No matter how long it takes, the authors have entered into this endeavor with positive confidence that even if the integration of computer technology into Kenyan schools does not happen immediately, it will happen with the help of informed decision making, and this survey can
be the first step towards that day. The information provided by this research is important as a starting point for policy makers to prioritize areas in which to concentrate innovative efforts in integrating technology into the schools in Kenya. Although Kenya has more than 2000 primary and secondary schools, some of these schools, mostly primary, do not have mailing addresses so that the authors have been limited in methods of collecting data from these schools. Further research has been planned to request grant support so interviewers who are fluent in Kiswahili as well as English can travel to target schools to collect data through interviews with teachers as well as administrators.

Generalization of the results of the research to other emerging or third-world countries can be useful, with careful examination of differences of those countries’ culture and status, because this research shows that key administrators and classroom teachers in one such country recognize the importance of educational technology to empowerment of their students in the global economy. The authors believe that the world is a global village, and that results from Kenya can be used to recommend policies and implementation plans to many 3rd world countries with similar needs, and committed citizens who are ready to learn and go forward with emerging technologies. For example, the development of wireless technologies and abilities to use laptops with wireless Internet connections may be the opportunity for countries such as Kenya to skip the expensive step of wiring all the schools for Internet access, and using new “airport” type Internet connection transmitters to implement Internet access school wide. Students who have no electricity or wired telephone access at home may use new technologies to stay connected at home while using technology provided to their schools. The opportunities for bringing these students into the 21st century workplace with technology literacy and confidence of their abilities to participate in the workplace are in existence; now stakeholders need to find the resources and methods to get them to the new generation of technology users.

References


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APPENDIX A

DEFINITION OF TERMS

For the purposes of this study, the following terms are operationally defined.

*Emerging Technology:* Technology which is still being newly formed or is seen as a prominent next development in technology. The value of such technology has yet to be determined due to its newness, but is important to be aware of because of its potential for a major impact on culture (e.g., development of microprocessors, personal computers, cell phones, electronic meetings, hypermedia development for interactive student learning, etc.)

*Multimedia:* This term is used in this study to refer to a combination of technological tools; for example, television, videos, cameras, overhead projectors, radio, videocassette recorders, tape recorders, and textbooks.

*Low or mature technology:* This term is used to refer to technological tools that have been around for quite a long time and are familiar to most people for example slide projectors, film projectors, audio tapes and recorders, posters, television, video cassette recorders.

*High or new technology:* This is used mostly to refer to current or recent computer-related technology that is in use but considered to be newer than mature technology.

*Technology:* This is used to refer to the physical, mechanical, or electronic capabilities of a medium in this study.
Dear Respondent:

I am attaching a survey that the first author of this research and I are requesting you complete. I am an assistant professor in the College of Education at Black Hills State University, in Spearfish, South Dakota, USA, and the first author is a graduate student in the College of Education. This is a voluntary survey which we are using to identify the number of computers that are being used in schools in Kenya, and opinions of administrators, teachers, and other officials in your country about using computers in education. The first author will use the results of this survey to write an article which will help her complete her requirements for a Masters of Science in Curriculum and Instruction.

Your individual response will not be associated in any way with the final results of the survey. Your response will be only be identified by a code number. Your answer will be treated as completely confidential. We hope these results can help contribute to planning for placing computers and technology in schools in Kenya within the next 10 years.

We thank you in advance for your contributing to our study. Please place your completed survey in the enclosed self addressed stamped envelope and mail it within 10 days.

Best Regards,

Second author, Assistant Professor
SURVEY:

NAME: __________________________________ POSITION: ______________

School: __________ MAILING ADDRESS (OPTIONAL)

(Please circle the answer which is closest to what you think)

1. To what extent are you familiar with computer technology?
   a. Not at all
   b. Somewhat familiar (use either E-mail, writing letters, or use the World Wide Web)
   c. Extensively familiar

2. a. Does your school have a computer? Yes No
   b. If more than one, how many? ______

3. a. Does your school plan to buy a computer? Yes No
   b. If yes, when? Please check one answer In the next year
      In the next 2 years Not sure when

4. To what extent do you think that having a computer would help your students learn?
   a. Very little
   b. Somewhat
   c. Very much

5. If you answered b. or c. to #3, what do you think the advantages are to having a computer for teaching? (Please, Circle all that apply)
a. A variety of sources for learning

b. A way to help students become more independent of the teacher

c. A way to teach students to be more responsible

d. A way to help students interact with people from other parts of the world

e. A computer helps the students keep up-to-date with current knowledge

f. A support for teachers in record keeping and providing up to date information

g. A place for students who need extra help to practice or study

h. Other: (please describe)

6. How would you justify to the government the purchase of computers for your school?

Please return this in the enclosed stamped, self-addressed envelope. Thank you for taking the time to respond to this survey.