SCHOOL CHARACTERISTICS AND THE USE OF COMPUTER TECHNOLOGY FOR SECONDARY SCHOOL ADMINISTRATION IN SOUTH-WEST NIGERIA.

BY

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CERTIFICATION

This is to certify that the Thesis:

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DEDICATION

This study is dedicated to the Only Wise God; to David Oyedepo Ministries International; a commission that inculcates in people the scriptural discipline of studying for skill development; and to my darling husband, Yemi and the choice children (Ayo, Sade and Tosin) whom God gave me by His favour. They have all inspired me to take this bold step and endure every contrary experience in the course of the study, particularly when armed robbers stole the laptop and other devices housing my processed data, references from the Internet, and other valuable information.

Your support has encouraged me to forge ahead successfully and this is the evidence.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

This study assessed the status of administrative use of computers in secondary schools in South-West Nigeria. A descriptive survey research design was used carry out the assessment. The study sample consists of 24 four public schools and 16 private schools in Lagos State, and 44 public schools and 15 private schools in Ogun State selected randomly. Ten basic administrative duties and eight selected school characteristics were used as the basis for the assessment. A model was proposed on possible explanations of school characteristics for the level of administrative use of computers in schools. The researcher hypothesized that placing computers in schools does not imply their automatic use because certain school factors play prominent role in effective use of the computers. Six research questions were answered and four research hypotheses tested. Both descriptive and inferential statistics were used for data analyses. Mean, percentages, selectivity indices and Gini coefficients were used to simplify data analysis. In addition, *t*-test for independent samples and One-Way Analysis of Variance were used to test the hypotheses. All hypotheses were tested at 0.05 level of significance.

The study found that public and private schools did not differ significantly in the administrative duties for which computers were used, though based on the mean values, private schools used their computers almost twice as much as public schools. Significant relationships were found between selected school characteristics such as ICT budget/funds, quantity of computer, quality of computer, proportion of staff with computer skills and disparities in administrative use of computers the secondary schools. The selected school characteristics contributed significantly to the disparities in administrative use of computers in secondary schools in the Lagos and Ogun States, but with more effect on public than private schools.

The implications for policy and practice respectively drawn from the study are that: administrative use of computers should be the primary goal of sending computers to schools; the policy of dumping computers in schools has to give way for the bidding system that gives schools a sense of ownership; computers can be used for other purposes apart from the original intent. The study highlighted the need for further studies on staff characteristics as they affect effective use of computers in schools since members of staff are directly responsible for the extent of use of those computers.

CHAPTER ONE

INTRODUCTION

This chapter focuses on the rationale behind the use of computers to facilitate administrative duties in secondary schools in Nigeria. Administrative activities pave the way for teaching and learning processes in chools.

Background to the Study

Technological advancement has made computers to become an integral part of the workplace. Riffel and Levin (1997) observe that schools are today under enormous pressure to respond to the demand by the larger society for the state-of-the-art educational services occasioned by current level of Information Technology (IT) development. Computers are one of the technological supports that can make the education system respond to this demand. Zandvlift and Straker (Akbaba-Altun, 2006) observe that IT use is increasing in nearly all facets of life in the developing world and its use is now progressing rapidly in many schools. Research and case studies conducted in the USA, UK, Australia and other developed and developing countries have confirmed that the use of ICTs in education can be beneficial, if they are utilized effectively (Oxford, Rosenthal & Urquhart, 2000). As the presence of technology continues to increase in education, it is important for educational leaders and administrators to recognize the significance of their role in technology implementation and utilization. Educational leaders should have a clear vision of the possibilities technology can provide. The integration of technology into a school is in many ways like its integration into any business setting – technology is a tool to improve productivity and practice. Cheung

(1999) observes that a school must be sensitive and responsive to its changing environment, be able to operate effectively within its limitations and be proactive to meet its developmental needs. This implies that, although technology constantly advances, making computers generally more capable and faster, one should not overlook the continuing usefulness of older ones. A computer, in simple terms, is a programmable device. It has the ability to perform any function at the discretion and inventiveness of the user.

The administrative uses of computers fall into four broad categories: data management, data analysis, word-processing, and communications (Ellis, 1984). For administrative tasks, computers can improve workers' productivity by removing repetitive aspects of complex tasks. National Forum on Education Statistics - NFES (2002) notes that incorporating technology into administrative processes implies infusing technology into the business and management of schools, the daily routine processes that allow classes to take place. A brief sample of the school records that can be stored and manipulated by microcomputers includes student records, personnel records, inventories of school equipment and financial records. Microcomputers can also be a potent tool in analyzing data. The electronic spreadsheet, for example, shows instantly the overall ramifications of any alteration in a school budget or other quantifiable data, such as enrollment projections, time schedules, or test averages. Available word processing programs enable administrators to compose, address, revise, correct, combine, rearrange, or delete written copy before printing multiple letter-perfect copies in a wide variety of formats. So, infusing a school with computers can be a transforming experience: the potential exists to change almost every aspect of school operations. Computers excel at manipulating information, performing complex calculations, graphing relationships, and accomplishing repetitive tasks. Thus they can make it easier for teachers and administrators to maintain

accurate records to improve school and classroom management. Cox, Preston, and Cox (1999) submit that one of the factors which has contributed to teachers' continuing use of ICT by experienced ICT teachers was the fact that ICT made the teachers' administration more efficient. Using computers can increase accuracy, reduce the time and costs involved in entering data, and make it possible to quickly retrieve and analyze information for decision-making. Thus computers can make it easier for school administrators to maintain accurate records to improve school administration (Anderson & Ronnkvist, 1999). Computers can improve the efficiency of operational processes through automation. For instance, if parents are given on the spot information relating to such issues as admission prospects for their wards in terms of availability of vacancies in desired classes, they can respond accordingly without delay to enroll their wards if there are vacancies, or make immediate alternative choices if there are no vacancies. To the school as an organization, delay in response may result in impatient parents looking elsewhere for solutions to their wards' admission problems, and a loss to the school when a school still has unutilized capacity. Due to better services offered consequent upon computerization, more demands will be placed on the services of the school thus bringing an additional annual profit in the case of private schools. Similarly, principals are able to streamline operations and monitor students' progress. Today, ICT also allows individuals in schools to work together effectively and efficiently (van der Zee, 1996). However, several factors affect whether and how they are used. These factors include placement of computers for equitable access, technical support, effective goals for technology use, new roles for teachers, time for on-going professional development, appropriate coaching of teachers at different level of skills, teacher incentives for use, availability of educational software, and sustained funding for technology (Gahala, 2001). Thus, the use of computers in school administration, which is essentially a quest for better administrative efficiency, requires the capacity of adaptation and innovation.

Schools are institutions established by law to carry out certain functions. The National Policy on Education (Federal Republic of Nigeria, 2004) realizes the importance of school administration in realizing the goals of education. Record keeping is a significant aspect of school administration. Consequently, laws were promulgated and edicts were enacted to facilitate the implementation of the policy by making provisions for certain records to be kept in schools. The Education Law of 1955 of the former Western Region and the Public Education Edict of 1974 of the former East Central State of Nigeria identified records that must be kept by every school to facilitate effective administration. Gorton (Peretomode, 1992) identified seven categories of administrative task-areas of the school administrator. These and some of their component activities for which computers can be used are: pupils' personnel (provide guidance and counseling services, maintain a system of child accounting, handle disciplinary cases, arrange systematic procedures for the continual assessment and reporting of pupils' performances, provide for individual inventory services), staff personnel (schedule teachers' assignments, coordinate the work of teachers, develop a system of staff personnel records), community-school relationship (confer with parents), instruction and curriculum development (provide for in-service education of personnel), school finance and business management (prepare the school budget, account for school monies, account for school properties), school plant (determine the school plant needs and the resources which can be marshaled to meet those needs), general tasks (organize and conduct meetings or conferences, publicize the work of the school, respond to correspondence, keep school records, schedule school programmes).

There is a general remark by scholars (Aghenta, 1992; Alani 1987, 1992; and Nwokwule, 1995) that different educational plans have suffered setbacks because of inadequate and

inaccurate statistical data. The use of computers in school administration makes it possible for information generated from different sources in the school to be managed and used to create different support systems for various decision-making bodies in the school. Data-driven decision-making ensures that timely, appropriate, and targeted intervention can be applied when and where they are needed. The integration of technology into management involves, at its core, the promotion of efficiencies in sharing information. Observations from school visits have shown that the same problems of data being kept haphazardly, missing documents containing school data, registers not kept as they should be, falsification of data, to mention a few, reoccur. Integrating computers into the school administrative system would help school administrators to effectively manage every aspect of school administration. It will, among other things, reduce the time spent on administrative tasks, improve record keeping efficiency, ensure consistent collection and update of information, help cultivate strong relationships between stakeholders and schools, and produce valuable reports to help drive future processes.

Information demand by stakeholders varies as much as stakeholders vary. For instance, the supervisory body may have the need for information on admission trends in schools. This information could be obtained from the admission registers. The time table record could help the school principal to monitor teachers' and students' movement or to locate a particular teacher at any point in time during school hours. When parents request for their wards' transcripts or transfer certificates, all the necessary information to process this request could be obtained from the students' personal database and examination scores database. The preparation of transcripts and certificates is part of the work of school administrators. Staff record of service could be collated from the personnel database. To adequately support a school project financially, the Parents-Teachers Association (PTA) might require information on the financial strength of the school. This

information would be readily and accurately available if the school accounts are computerized. So, schools have to contend with a lot of data processing. Therefore, the problem is not that such data are not available at the school level, but as Alani (2000b) has noted, such data are badly kept as a result of insufficient modern equipment for storing the data. Computers are tools for keeping and processing data accurately and for retrieving information in good time to inform timely policy decisions.

In spite of the capabilities of computers, they are not a substitute for poor administrative systems. According to Ajayi and Ayodele (2005), administration has been defined as the coordination and efficient use of resources to achieve the goals of an organization, and that one of the elements of administration is adaptability; that is, administrators should be adaptable to changes necessitated by the dynamic nature of the school environment. These two elements have implications for the use of computers in schools. There is the tendency to abandon older computers for newer ones in ignorance whereas there is no functional computer that cannot be used for one basic administrative task or the other in secondary schools. Since computers are not rigidly configured but are flexible, they can be adapted to meet specific managerial needs. Adaptation can be achieved, either by attaching relevant devices or by customizing software purchased off-the-shelve in order to capture the necessary information required for particular managerial tasks. The extent of adaptation is influenced by the kind and amount of information about the computer system communicated to users, and the nature and form of training they receive on the technology (Orlikowski, 1992).

As schools attempt to gain advantages through the use of computers, school administrators must be able to identify the tasks to which computers could be applied, acquire the components and infrastructure necessary for their use and encourage the full

diffusion of the system throughout the school. According to Chapman, Garrette and Mahlck (2004), achieving this requires giving adequate attention to the needs of those that will use the computers in ways that promote, rather than undermine, quality administration. Hence, personnel have to upgrade their skills fairly often and this must be built into the school budget. This may also involve ensuring easy access to the computers in the school, and making adequate number of computers available for use by the staff, among others. The rationale behind the acquisition of computers dictates their ultimate use. Some public schools acquire computers for political reasons while some private schools acquire computers to lure parents without providing enabling environment for their use. For instance, Nwosu (2003) found that 50% of secondary schools in Nsukka urban area had computers, and a sizeable number of the schools realized that computers would simplify their administrative work, yet only 30% of the schools that had computers used them, and for teaching only.

Having advisers who can provide technical support and a resource base to guide school managers is acknowledged as crucial to the effective use of ICTs (Lundall & Powell, 2000). Pelgrum and Law (2003) argue that the integration of computers into schools requires all the necessary equipment, unhindered access to the equipment, competent staff to get the equipment running and who can teach others to use it correctly and effectively, and technical support. Claudio de Moura (2004) and the World Bank (Kalu & Ekwueme, 2003) observe that abundant financial resources and skilled personnel are necessary to use computers creatively. Thus, the presence of these factors in secondary schools would be necessary to facilitate the use of the computers for administrative duties.

Administrative use of computers sometimes usually involves the use of basic applications such as word processing. This kind of use requires little technical skill in the handling of software or hardware. Computers are adaptable or customizable to users' needs (Dougiamas, 1998), but the advantages of these features can be optimized with adequate knowledge of application of relevant software to each administrative task. In the past decade, application software often focused on custom-designed drill-based softwares for specific outcomes. Now, as observed by Smyth (Dougiamas, 1998), the trend is moving toward using open-ended packages and non-content specific applications such as "office" applications in order to stimulate thinking and problem solving. Content-free software aims to represent flexible tools that can be shaped by users to suit their needs. So, basic skills, which can be acquired in basic training sessions or through personal use of computer, would be sufficient for effective use of computers in the administration of secondary schools.

The recognition of the significant role of ICT in education in Nigeria dates back to the 1980s when the Federal Government of Nigeria, through the Federal Ministry of Education, constituted a national committee in 1987 to examine the need for and use of computer for national development. As a follow up, computers were sent to the Federal Government Colleges (FGCs) and some Command Secondary schools. Borisade reports that the Federal Ministry of Education (FME) introduced computer studies in FGCs in 1990 (Ozoji, 2003). The ministry further organized annual computer holiday programmes for secondary schools, in collaboration with some oil companies, and also provided some computers for the FGCs. However, Ndefo (2005) and this researcher observe that these computers are merely used as typewriters where they are used at all.

The World Bank (2002) opines that secondary education holds a privileged position in all education systems, being placed between the primary and tertiary levels in structure and content. The Organization of African Unity (OAU) Conference of Ministers of Education (COMEDAF) and the meeting of the Consortium on Secondary Education organized by UNESCO (UNESCO 1999; 2000) respectively concluded that, in order to meet the challenges of the 21st Century and for secondary education to play its vital role of regulator in the education system, that level of education must be reorganized. To achieve this reorganization, one of the major recommendations of the Regional Conference on Secondary Education is the introduction of ICT in secondary schools (Sokan, 2003). SchoolNet Nigeria (2003), a non-profit organization, through a project called SchoolNet Diginet, introduced Information and Communication Technologies (ICTs) in both primary and secondary schools in Nigeria with a view to addressing the problem of paucity of technological infrastructure in Nigerian schools. The project essentially provides digital access (computers and Internet) to Nigerian schools and has put in place all necessary monitoring devices and comprehensive training package (face-to-face and on-line) to ensure not just the success of the project, but also its sustainability by participating schools. The Computer for All Nigerians Initiative (CANI) of the Obasanjo Administration was a federal government's initiative geared towards providing laptops for children in schools. This researcher observes during official visits to the states in the South-West Nigeria that the states have introduced the use of computers in their respective secondary schools. From the foregoing, it can be assumed that public secondary schools have received more attention in the provision of computers either by the government or by private organizations more than the public primary schools. This study is, therefore, proposing that any functional computers, irrespective of its configuration can be used for basic administrative tasks that are being performed in schools.

The use of computers for administrative tasks in schools is based on the premise that if effective information and interaction support were provided, the quality of school administration would improve. Therefore, with the importance attached to the position of secondary education, and the observations by Nwosu (2003), Ndefo (2005), Zhao and Frank (2007) and by this researcher that computers in secondary schools are either not used or are used for teaching and learning purposes only, in spite of the investments by governments and private and corporate entities, there is the need to find out why the computers in the secondary schools are not being used for administrative purposes. Schneider records that individuals actualize their potentials when the organizational culture is congruent with their own work values, interests and capabilities (Miron, Erez, & Naveh, 2004). Brummelhuis and Plomp describe the introduction of computers in education as a complex innovation in which many obstacles need to be overcome before one can speak of successful innovation (Akbaba-Altun, 2006). Hence this study has assessed the possible effect of school characteristics such as staff attitude to the use of computers, application areas of computers, quantity and quality of computers, access to computers, availability of skill development programme for staff, availability of ICT budget, length of use, rationale for acquiring computers, and availability of infrastructure including technical support on the use of computers by secondary school administrators in Lagos and Ogun states to perform administrative duties. This assessment was done with a view to suggesting how computers in schools could be effectively used to facilitate school administration and identifying appropriate strategies that could be adopted to integrate computers in school administration in those schools that are contemplating such.

Statement of the Problem

Cox, Preston, & Cox (1999) observe that many studies of the uptake of ICT in education have shown that there has been a disappointingly slow uptake of ICT in schools by the majority of teachers. In spite of the problems of application of computer technologies in many school organizations and strong tendencies within organizations that constrain IT effectiveness (Montealegre, 1999), the Organization for Economic Cooperation and Development (OECD) notes that many countries are making substantial investments in computers and Internet for schools for teaching and learning (Plante & Beattie, 2004). The current context of educational policy in Nigeria seems to assume that supplying computers to schools will increase their innovative use. Goos and Bennison (2006) observe that internationally there is research evidence that this is not necessarily the case. Nwosu (2003) and Ndefo (2005) also observe the same trend. Administration is what allows class activities to take place. There is a need, therefore, to examine the nature and extent of actual use of these technologies and identify factors that support or inhibit their effective integration in their administrative practice.

While some studies (Akale, 2003; Anaekwe, 2003; Kalu and Ekwueme, 2003) have investigated the use of computers for teaching and learning in secondary schools in Nigeria, there is a dearth of any study probing into the administrative use of computers in secondary schools. Computers are so flexible that though they were sent to schools for teaching and learning, they can be used for processing schools' data such as school accounts, payroll, inventory, personnel and students' records (Ilori, 1995), thus providing timely and reliable information for effective administration. Hence, it appears that while much emphasis is placed on the use of computers for improving teaching and learning in secondary schools, not much is known about their application in school administration.

According to Roszell (Krysa, 1998), Montealegre (1999), and Venezky and Davis (Nachmias, Mioduser, Cohen, Tubin & Forkosh-Baruch, 2004), there are strong tendencies within organizations that constrain IT effectiveness.

This study is, therefore, informed by the foregoing observations. Therefore, the premise of this study is that the uneven record of success in using information technology in schools can be accounted for, in large part, by the differences in school characteristics. The basic assumption guiding this study is that to devise successful implementation strategies for information technology applications in schools, the reasons why the computers in schools are not used must be understood. It is against this background that the study examines the differences in school characteristics that may be used to explain observed disparities in the administrative use of computers in the secondary schools, and identify factors that support or inhibit effective integration of computers into administrative practices, with a view to informing policy on implementation strategies to encourage the use of computers in the schools and guide future interventions by government, individuals and corporate bodies in this area.

Theoretical Framework

Schitz and Azbell (2003), talking of the roles of ICT in education, observe that the primary concern centers around the question of "Does it work?" in the face of continuing absence of a theoretical framework for using technology, which they argue, may be borne out of the fact that everyone does not want the same thing out of technology. They argue that whether or not investments in computers in schools have yielded significant results, particularly results sufficiently compelling to justify investments, has been the question. Computer technology is an application domain that can be adapted to suit individual

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needs. The application areas and knowledge requirements are not static but rather evolve as technology changes. As noted by Akbaba-Altun (2006), efficient use of computers demands that users are able to adapt available computers to meet their needs and this is a function of many factors. This researcher found no single theory to sufficiently address this issues bordering on the effective use of computers in schools. Hence, the study draws on multiple theoretical perspectives based on the fusion of Rogers' Diffusion of Innovation Theory/Innovation Dissemination Theory/Theory of Adoption (Surry & Farquhar, 1997; Suurla, Markkula & Nupponen, 1998; Yates, 2001; and Rogers, 2005), Cohen and Levinthal's Theory of Absorption (Todorova & Durisin, 2003; Vinding, 2004), and Poole and DeSanctis Adaptive Structuration Theory (Mandviwalla, 1994; Griffith, 1999; Kock, 1999; Sikkel, Ruel & Wieringa, 1999).

Roger's Theory of Diffusion of Innovations/Innovation Dissemination /Adoption.

Adoption can be defined as the process by which an innovation spreads through a population. Although computers are no longer a novelty in most organizations, for many schools they are a novelty and an innovation. Amabile defines innovation as the successful implementation of creative ideas by an organization (Miron, Erez & Naveh, 2004). The researcher responsible for the most significant findings and appropriate theories related to adoption and diffusion of innovation is Everett M. Rogers (Surry & Farquhar, 1997; and Yates, 2001). This theory proposes that, "technological innovation is communicated through certain channels, over time among the members of a social system" (Rogers, 2005; p.5). This theory highlights the four main elements of diffusion. In this study, adopting ICT for administrative use in schools is an innovation and, innovation is defined as, "any idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2005; p. 12). Surry and Farquhar (1997) and Yates (2001) define diffusion as the process by which an innovation gains acceptance

by members of a certain community. Dissemination refers to a special communication process that spreads information about a service being introduced to the members of a community (Suurla, Markkula & Nupponen, 1998). Diffusion, adoption or dissemination theory, therefore, emphasizes the process of making an innovation attractive or acceptable to members of a social set-up.

Sherry and Gibson (2002) and Sherry (2004) state that the diffusion process generally follows the traditional top-down process in which administrative mandate introduces the innovation and the administrative perceptions, decisions and strategies to drive the diffusion. Thus, the limitations of this theory can be viewed in the following perspectives:

1. It tends to deal with centralized organizations rather than schools characterized by site-based management.
2. It tends to deal with an innovation that cannot change over time, rather than an innovation (such as computer technology and telecommunications) whose very nature is to evolve and change with time.
3. Traditional organizations tend to have hierarchical structures within which an innovation can diffuse vertically (especially if top-down mandated), whereas innovations within schools tend to diffuse horizontally.

In spite of these limitations, the following discussion on the relevance of the theory to this study is based on three elements of the theory. First, an individual sees an innovation (whether an idea, practice or object) as new. The characteristics of an innovation, as seen by the members of a social system, determine its rate of adoption (Askar, Usluel & Muncu, 2006). If technology is seen to provide some type of increased effectiveness or efficiency, then individuals are more likely to adopt the technology (Rogers, 2005). Secondly, the reaction/attitude of individuals to an innovation depends on how it is

communicated. Communication is a means of passing information and information builds up knowledge. Training an adopter in the practical use of the computer, for example, is a form of communication channel that helps him/her to embrace it faster than when his/her knowledge is theoretical. Thirdly, the time attribute plays a role in the innovation-decision process. This is a process through which an individual passes from first knowledge of an innovation, to the formation of an attitude toward the innovation, to a decision to adopt or reject, to implementation and use of the new idea, and to confirmation of this decision. So, the length of use of computers is crucial to building up the versatility of the users. Thus, this theory addresses issues of attitude, training and length of use of an object, which are some of the variables of this study.

Theory of Absorptive Capacity.

Developing a culture that embraces technology is important to its successful integration – a culture that accepts technology as "natural" to the business of everyday work. Central to a firm's dynamic capability to absorb and implement new practices is Absorptive Capacity. Cohen and Levinthal introduced absorptive capacity in 1990 (Wade, 2005). Cohen and Levinthal (1990) hypothesized and Macduffie (Lenox & King, 2004) demonstrated that the adoption of one practice might provide information about the value of similar practices. The Theory of Absorptive Capacity proposes that prior related practices may inform the decision to adopt a new practice. In other words, a firm's stock of prior related knowledge determines the ability of a firm to absorb new knowledge and practices (Cohen & Levinthal, 1990). Hence, it can be assumed that using computer for teaching and learning may provide some knowledge for administrative use of computers in schools. According to Cohen and Levinthal (Kumar & Seth, 2001; Lenox & King, 2004; Vinding, 2004; Wade, 2005), absorptive capacity is the ability of a firm to value new knowledge, absorb it, and apply it; and it is fundamentally tied to the innovative

capacity of the firm. Thus, absorptive capacity is a limit to the rate or quantity of scientific or technological information that a firm can absorb (Wade, 2005). According to Mooney (1996), the Theory of Absorptive Capacity is based on the premise that an organization's ability to effectively apply IT is dependent on the development of IT-related knowledge. The relatedness of the knowledge stock influences which types of new knowledge and practices are likely to be absorbed (Lenox & King, 2004). So, antecedents of innovative capacity are prior-based knowledge (knowledge stocks and knowledge flows) as well as communication. The theory proposes that knowledge gained from prior experience facilitates the identification, selection, and implementation of related profitable practices; and a firm's absorptive capacity derives from stocks of knowledge within the firm (Lenox & King, 2004). Zahra and George (Todorova & Durisin, 2003) define absorptive capacity as a dynamic capability, which consists of a set of organizational processes that make a firm's skills and resources work together. Cohen and Levinthal (Lenox & King, 2004) emphasize that absorptive capacity depends on the transfer of knowledge across and within sub-units and that a firm's stock of prior related knowledge determines the ability of the firm to absorb new knowledge. Also, the distribution of knowledge within the organization and the organization's ability to transfer this knowledge internally is critical to absorptive capacity. This theory thus emphasizes knowledge stocks and the acquisition of such knowledge across and within subunits of an establishment (a school in this case). The relevance of this theory to this study derives from its proposition that, knowledge is gained through experience according to Lenox and King (2004), and this researcher believes that access to the use of the computers in schools promotes knowledge and experience. Experience may connote length of use. The theory also talks about transfer of knowledge within and across sub-units of an organization, which this study considers can be achieved through the provision of skill development programme for staff. Hence, this theory addresses length

of use, access to computers, and skill development on use of technology, which are some of the variables of this study.

Adaptive Structuration Theory.

NFES (2002) asserts that the goal of perfect technology integration is inherently unreachable: technologies change and develop, staff move and things change, however, it is the process by which people and their institutional setting adapt to the technology that matters. Adaptive Structuration Theory (AST) asserts that organizational backgrounds can result in different results of Group Decision Support System (GDSS) implementation (Poole & DeSanctis, 1994), hence AST is appropriate for explaining innovative appropriations of information technologies. According to Kock (1999), one emergent theory, which tries to explain the use, by groups, of an innovation, is the Adaptive Structuration Theory (AST). AST suggests that groups are not merely information processing entities but they have a social existence that must be considered when they use IT (Chin, Gopal & Salisbury, 1997). This social aspect determines how groups use or appropriate the computers for their own purpose. DeSanctis (Chin et al., 1997) observes that researchers assume that features that enhanced groups' information processing capabilities would predictably lead to improvements in outcomes for all groups that used these features. However, Dennus and Gallupe (Chin et al., 1997) observe that the results of the application of this input-output framework have been inconsistent and as a consequence, there has emerged an appreciation for the processes that intervene in the relationship between computerized system and the outcome of its use. Cheng (1996) notes that, a school needs to be sensitive and responsive to its changing environment, able to adapt to its limitations, and to be proactive to meet its developmental needs. Claudio de Moura (2004) observes that the difficulties of fulfilling the potentials offered by

technologies are due to the failure to adapt these technologies to the contexts within which they are being used.

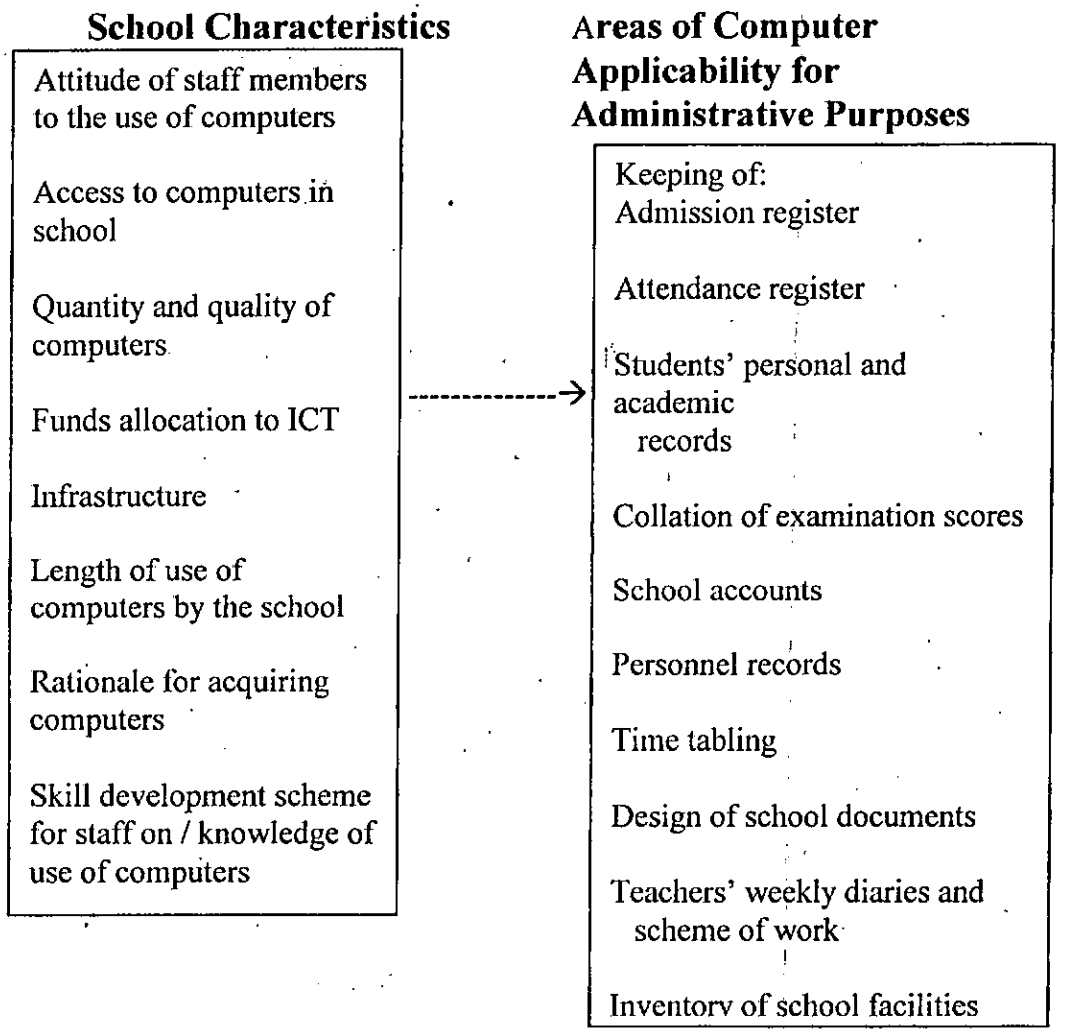
Deborah, Bob and Renne (2003) identify the following strengths of AST: First, it facilitates analysis of between-group differences; second, it accounts for the structural potential of technology, while at the same time focusing on technology use as a key determinant of technology impacts; and, third, AST provides a general approach to the study of how groups organize themselves, a process that plays a crucial role in group outcomes.

This theory conforms very neatly to the generic or otherwise adaptive nature of computer systems. Adaptiveness is the school's ability to respond to or adapt to changes in its environment. Adaptive school systems are dynamic organizations that change readily as new technologies emerge (Peretomode, 1992). From Griffin's (2000) point of view, AST speaks to the processes by which human interaction, technology, and social structures combine to create a technology-in-use. Sikkel, Ruel and Wieringer (1999), however, note that AST emphasizes adaptation as being subject to group dynamics (that is, different groups appropriate or adapt the same technology in different ways). Users of technology make choices from structural potential of the technology and adapt them to their needs. Adaptation, therefore, differs between groups even when the same structures are available. This theory emphasizes group differences in appropriating a technology. From the foregoing, differences in the extent of use of computers may result from group differences, such as the ability of a school to be proactive enough to provide enabling environment in terms of infrastructure, ICT funds, staff skill development programme in ICT and thus provide the platform for the ability to adapt to the limitations (quality and quantity) of available computers, and having a predefined goal for acquiring computers.

Each of the theories discussed above addresses in part the issues relating to the characteristics under consideration. This researcher opines that the synthesis of these theories with focus on their respective aspects that are relevant to this study would be more fruitful for the study rather than choosing one over the other. All the theories, however, emphasize adequate knowledge base as critical to absorption, adoption and adaptation of an innovation. Based on the emphasis the theories lay on knowledge and how an individual perceives an innovation, this researcher believes that attitude and staff skill development are major factors of absorptive and adaptive capacities.

The theoretical framework of this study is thus based on a proposition encompassing some of the features of each of the three theories as depicted in Figure 1 and as suggested thus: the ability of a school to adapt computers to more administrative tasks depends on the characteristics of the school.

Figure 1 suggests that the number of the basic administrative duties that computers are used for in individual schools may be affected by any or a combination of all of the school characteristics in the model.



----------→ This Model should be viewed merely as plausible representation and Not as a cause and effect relationship

Figure 1: Model for Assessing School Characteristics and Administrative Application Areas of Computers in Secondary Schools in Lagos and Ogun States in South-West Nigeria

Objectives of the Study

The objectives of the study are to:

1. assess the disparities in selected school characteristics such as attitude to the use of computers, access to computers, length of use, and rationale for acquiring computers among secondary schools;
2. assess the differences in the administrative duties for which computers are used among different school categories;
3. assess the disparities in the quantity of functional computers, and proportion of staff knowledgeable in computer usage among secondary schools;
4. determine the extent to which schools differ in the skill development programme for staff in basic administrative application packages, quality of functional computers, and available infrastructure;
5. identify the factors that appear to enhance or inhibit the use of computers for administrative tasks in secondary schools;
6. identify the differences in items on which ICT budgets are spent in schools;
7. determine the link between differences in selected school characteristics (ICT budget, quantity of computer, quality of computer, and skill development programme for staff in the use of computers) and disparities in the use of computers for administrative tasks among schools; and
8. identify ways of facilitating the use of computers.

Research Questions

The following research questions guide the study:

1. What disparities exist among secondary schools' characteristics such as attitude to the use of computers, access to computers, length of use, rationale for acquiring computers, and provision for ICT budget?
2. Do public and private schools differ in terms of administrative duties for which computers are used?
3. What disparities exist among secondary schools with regard to the quantity of functional computers, and proportion of staff knowledgeable in computer usage?
4. To what extent do schools differ in the skill development programme for staff in basic administrative application packages, quality of functional computers, and available infrastructure?
5. What factors enhance or inhibit the use of computers in secondary school administration?
6. What disparities exist in the items ICT budgets are used for among the secondary schools?
7. What is the relationship between differences in selected school characteristics (funds allocation to ICT, quantity and quality of computers, and proportion of staff with computer skill) and disparities in administrative application areas of computers?
8. What can be done to facilitate the use of computers in schools for administrative tasks?

Hypotheses

The following operational hypotheses were formulated to guide the study:

1. There is no significant difference between public and private schools in the administrative duties for which computers are used.
2. There is no significant relationship between differences in selected school characteristics (funds allocation to ICT, quantity and quality of computers, and proportion of staff with computer skill) and disparities in administrative use of computers in public secondary schools.
3. There is no significant relationship between differences in selected school characteristics (funds allocation to ICT, quantity and quality of computers, and proportion of staff with computer skill) and disparities in administrative use of computers in private secondary schools.
4. There is no significant relationship between differences in selected school characteristics (funds allocation to ICT, quantity and quality of computers, and proportion of staff with computer skill) and disparities in administrative use of computers in public and private secondary schools.

Significance of the Study

The following are the significance of the study:

1. The data required for policy decisions at the micro and macro levels of educational administration emanate from the schools. The study shows that computer technology-driven administration will ease the production of data both for schools and policy maker, and thereby solve the problem of lack of accurate and timely data for policy decisions in the education sector.

2. School administrators that are involved in the process of acquiring computers for their respective schools will have a sense of ownership, thereby compelling them to ensure the effective use of the computers.
3. The study will help policy makers and administrators at the school level know the requirements for successful implementation strategies in integrating computers into schools.
4. The study will also provide a framework for policy makers to retool the computer-in-school program, raise awareness of the practitioners toward integrating computers into school processes, and increase awareness that the ICT issues in different school contexts can contribute to Nigerian government's understanding of technology transfer.
5. School factors will become part of indicators of success in policy execution. For example, if computer increases, access is expected to increase, otherwise there must be some intervening factors that should be adequately considered.

Scope of the Study

The study covers both public and private secondary schools that have had computers for at least five years in Lagos and Ogun states in South-West Nigeria. Five years were chosen because Larsen, Tonge and Roberts (2001), and Ward and Parr (2003) have observed that ICT strategies follow a 3-5 year cycle. The study investigated the use of computers for secondary school administration in the two states. The following administrative duties (application areas) were considered the minimum and regular duties in a secondary school by the researcher: keeping students' admission and attendance registers, time tabling, design of school documents (e.g., students' transcripts, report cards, testimonials, reference letters, lesson notes, examination questions), keeping

students' personal and academic records, collation of examination scores, keeping school accounts (bank statements, students' pocket money account, ledger, etc.), inventory of school facilities, preparation of teachers' weekly diaries and scheme of work, and keeping personnel records. These were used to assess the disparities in administrative application areas of computers in the sampled schools. The computer technology resources (the software, hardware, etc.) in the schools were also assessed.

Variables of the Study

The school characteristics focused on in this study constitute the variables of the study. These are staff attitude to the use of computers, application areas of computers, quantity and quality of computers, access to computers, skill development programme for staff, provision for ICT in school's budget, length of use, rationale for acquiring computers, and availability of infrastructure (including technical support).

Operational Definition of Terms

In this study, the following terms are used as defined below:

Absorptive capacity.

This refers to the measure of facilities and operational conditions within the school, which can propel staff to use computers for their administrative tasks. Proxies for absorptive capacity in this study include the proportion of staff knowledgeable in the use of computers, staff members' access to computers in the school, the quantity and quality of available functional computers, infrastructure available, and attitude of members of staff to the use of computers in administration.

Adaptive ability.

This refers to the ability of schools' staff to use what is available (computers and software) to carry out their administrative tasks.

Administrative duties.

These refer to keeping students' admission and attendance registers, time tabling, design of school documents (e.g., students' transcripts, report cards, testimonials, reference letters, lesson notes, examination questions), keeping students' personal and academic records, collation of examination scores, keeping school accounts (bank statements, students' pocket money account, ledger, etc.), and keeping personnel records.

Attitude.

This refers to staff member's reaction to the administrative use of computers in the school based on what he or she knows, feels or believes about computers.

Computer technology.

Computer technology refers to the collection of personal computers (PCs) and infrasctructure required to make computers useable. Computers, Information Technology (IT) and Information and Communication Technologies (ICTs) all refer to technologies employed in collecting, storing, editing, retrieving, and disseminating information in diverse forms. Thus computer technology, IT and ICTs are used interchangeably in this study.

Computer quality.

The surrogate for computer quality is the speed. Computers are classified by processor speeds. Processor speeds are measured in Megahertz (MHz), with each MHz representing 1 million cycles per second (the number of times the computer processor is able to

perform a task). Computers with low processor speed include those with processor in the range 66-233 MHz (e.g. 486, Pentium I). Computers with medium processor speed typically range between 233 MHz and 1.4 GHz (Gigahertz) (e.g. Pentium II/III). High processor speed computers are typically with speed of 1.3 GHz to 3.8GHz and sometimes higher (e.g. Pentium IV).

Facilitators.

These refer to those factors in the school setting that act as incentives for administrators and which have positive effect on the administrative use of computers in schools. Examples are extensive computer facilities in the school, strong financial position of the school, ICT training package for staff, etc.

Infrastructure.

This refers to facilities that make the environment conducive for the use of ICT in schools. Such facilities include power supply, technical support, and relevant software packages.

Inhibitors.

These refer to those conditional factors in the school setting that act as disincentives for administrators in the use of computers in schools. Examples are lack of constant electricity supply, lack of appropriate skill development programme, financial constraint, inaccessibility to computers, etc.

Rationale for computer acquisition.

This refers to clearly defined goals for the acquisition of computers which have been stated at the outset.

Ready-made Off-the-Shelf packages.

These are commercially available educational software packages that have been prepared bearing in mind all possible users' needs/queries.

School characteristics.

School characteristics refer to the attitude of members of staff to the use of computers for administrative tasks, staff members' access to computers, staff training in the use of ICT, ICT funds, quantity and quality of computers, length of use, infrastructure, and rationale for acquiring computers.

Public and Private secondary schools.

In this study, a public secondary school is owned and managed by government, and a private secondary school is owned and managed by an individual or private organization.

CHAPTER TWO

LITERATURE REVIEW

This chapter focuses on the review of literature related to this study. A review of literature has been done around the variables of the study namely: staff attitude to the use of computers, access to computers, application areas of computers, fund allocation to ICT items, infrastructure (including technical support), length of use of computers, quality of computers, quantity of computers, rationale for acquiring computers, and skill development in the use of ICT. The literature review has highlighted the role played by certain factors in the effective use of computers in schools. Barriers to integration have included inadequate hardware and software, difficulties in securing sufficient funding, inadequate staff development, and deficiencies in planning (NFES, 2002). Researchers, in trying to gain an understanding of how technology use is mediated by factors, found common barriers to the use of technology by teachers to include: vision, access, time, and professional development (Angers & Machtmes, 2005). According to Berge and Mrozowski (1999), time, access, resources, expertise and support are barriers that occur repeatedly in literature. Roszell (Krysa, 1998) carried out a review of literature on factors having an effect on the implementation of IT in schools and identified the most important factors as: access to computers, availability of software, self-motivation, confidence and skill, the amount of time available for software review and teacher preparation, priority of computer use in the schools, availability of hardware, attitudes of administrators, and teacher education and training. Gahala (2001) identified factors that affect whether and how technology in schools is used as: placement of computers for equitable access, technical support, effective goals for technology use, new roles for teachers, time for

ongoing professional development, appropriate coaching of teachers at different skills levels, teacher incentive for use, availability of educational software, and sustained funding for technology.

The foregoing shows that previous studies indicated that computer accessibility, expertise or professional development, time (which can be synonymous with length of use), infrastructure in terms of quality and quantity of hardware and software available for use are frequently occurring factors affecting the use of computers for teaching and learning in schools. The frequently occurring factors in the studies on the use of computers for teaching and learning have therefore been considered as part of the variables of this study around which a review of literature was carried out in order to assess their effects on administrative use of computer.

Attitudes to the use of computers for administrative tasks.

According to Poole and DeSanctis (Chin, Gopal & Salisbury, 1997), one of the elements of the constructs that may be used to represent social existence that must be considered when groups use IT is group members' attitude to its use. Kelvin' and Trandis' (Anumnu, 2006) argue that attitude can be inferred from what a person says, feels, or thinks about, and how the person would like to behave toward an attitude object. So, attitude is related to the role played in the adoption of an innovation. According to Rogers (2005), an innovation is adopted if it is perceived as offering a relative advantage over the firm's current state. In other words, as noted by some scholars (Hinnant, 2002; Poku & Vlosky, 2002; Rogers, 2005; Chapman, Garrett, & Mahlck, 2004; Pelliccione & Giddings, 2004; Stirman, Crits-Christoph & DeRubeis, 2004), those who cannot identify any benefits for themselves are less likely to attempt to adopt ICT in their own tasks. The implication is that school administrators would tend to adopt or use computers for their administrative

duties based on their beliefs. However, feeling good about an attitude object is not a sufficient condition for embracing it. The object must first be available and must be attractive. Making a computer attractive for use is a combination of many factors. For example, an object that is not accessible cannot be adopted. A comfortable level of understanding of the object is required before it can be successfully embraced. The object must be in good shape for it to be adoptable. The most pressing needs of teachers (who always constitute a greater percentage of the workforce in schools) are more time to develop resources, plan lessons and curriculum units. Manually carrying out these tasks takes more time. If the same quantity of time spent manually is devoted to computerizing these tasks, the tasks will be accomplished faster and there will still be some time left to explore the gray areas of the computer. In the process, skill will be built, and the urge to make more use of the computer will be developed. A continued use of the computer, over a period of time will encourage its continued adoption, provided unhindered access is guaranteed. Some experience with the object would foster its adoption. Some empirical studies have concluded that computer experience significantly relates to a more positive attitude towards computers (Olalere, 2005). This means that, the attitude of an individual about an innovation leads to its adoption or rejection (Runge & Lee, 2004).

On the other hand, a study found that some teachers do not believe that computers have a useful educational objective (Krysa, 1998). These teachers do not believe because they do not have a personal experience with computers. Bennett and Bennett express the view that the most important barrier that teachers face using technology is lack of willingness based on their belief that technology is not useful (Askar, Usluel & Muncu, 2006). Anyone exhibiting lack of willingness to embrace a tool that will make it easy for him or her to carry out his or her regular assignment is merely displaying ignorance about the tool. This researcher believes that with adequate knowledge, all administrative staff,

teachers inclusive, would embrace administrative use of computers because there will be no such fear as changes in pedagogy, feeling inferior relative to students in knowledge of use as it is in using computers for teaching. Making a mistake while using computers for administrative tasks does not expose the user to ridicule in the presence of students. Therefore, in the face of general findings by scholars (Long, 1994; Stevens, 1995; Mooney, 1996; Frambach & Schillewaert, 1999; Sikkel, Ruel & Wieringer, 1999; Lundall & Powell, 2000; Pelliccione & Giddings, 2000; Hinnant, 2002; Steward, 2002; Stirman, Crits-Christoph & DeRubeis, 2004; Kim & Bretschneider, 2004) that attitudes are both affected by, and dictate the levels of ICT usage, with high level usage correlating with positive attitudes and low level usage correlating strongly with negative attitudes, there is the need to assess the attitude of school administrators to the use of computers for administrative duties.

Access to computers by staff members.

Computers cannot become a meaningful support for school administrators if they have access to them only occasionally. Some scholars (Long, 1994; Suurla, Markkula & Nupponen, 1998; Paul, 1999; Sherry & Gibson, 2002; Lenox & King, 2003; Ogu, 2003; Pelgrum & Law, 2003; Chapman, Garrette & Mählck, 2004; Schulz-Zander, 2004) have observed that success in the use of computers requires easy access to them. Access may connote availability of computers to staff at the time of need, or having time to use the computers when available such that even when the facilities are available, users must create enough time to interact meaningfully with the facilities. The mere presence of computers in a school building does not mean that members of staff have access in the sense of opportunities to actually use the computers. Cawthera (2001) notes that anecdotal evidence is mounting to indicate that simply putting a computer lab into a school with the appropriate hardware and software does not bring about effective

computer provision. Although schools may have computers available, one factor that determines their use is where those computers are located (Gahala, 2001). Gahala notes that standard computer lab is commonly used in schools, but if the use of the computer lab is carefully scheduled, it will provide high equipment utilization. When schools aggregate computers and place them in a shared place such as a computer laboratory, they do so to ensure these resources are available to more staff and students. On the other hand, from this experience, keeping computers in one place is a barrier to using them on a continual but intermittent basis because placing a resource in shared location outside of the normal working place of staff means that there is a distance between the location of the computers and the prospective users. This will create a limitation to accessibility and make it more difficult to integrate computers into their activities. The barrier of poor or limited accessibility prevents true integration of computers into any organizational processes. Data from national surveys (Means & Oslon, 1995) suggest that although American schools have more microcomputers than those of any other country, the level of access is still insufficient to fulfill technology's educational potential. Means and Oslon (1995) observed that to the extent that computers were clustered in a few labs in one part of the school, most teachers had little opportunity to, and indeed felt little responsibility for, integrating technology into their instruction. Some educational technology specialists argue that proximity and easy access to computers are dominant factors in achieving high rates of use by teachers (Rusten, 2002) and this tallies with Robertson, Calder, Fung, Jones, O'Shea, and Lambrechts (Mumtaz, 2000)'s findings that access to personal palmtop computers increased the staff's use of application packages in their work, particularly for administration (e.g., class registers, and assessment scores). Constantly having to battle with inadequate facilities certainly affects the way an individual chooses to work and the effectiveness of his/her work. However, access goes beyond identifying the number of computers and the type that is available. It includes

whether or not staff can get to use the technology at the point of need (during and even outside regular school hours).

Time, which is one of the elements of adoption according to Rogers (2005), is an issue in access. According to Goos and Bennison (2006), the most pressing needs of teachers (who constitute a greater percentage of the total work force in schools) are more time to develop resources, plan lessons and curriculum units. An innovative school administrator must not only be able to adapt the computer to his/her needs, he must be adaptable to changes (in this case, integration o computer into school processes) in the school environment. In that case, if the length of time required to manually develop resources and plan lessons and curriculum units is invested into electronically carrying out those tasks, the tasks will be accomplished fast and there will still be some time left to have hands-on experience with the computers. By so doing, skill is built, the urge to use the computers again and again is developed, and positive attitude is developed and sustained. The results of a study of schools in Silicon Valley, California as reported by Cuban, Kirkpatrick and Peck (Sherry & Gibson, 2002) showed that access to equipment and software seldom led to widespread use due to contextual factors within the high school environment rather than individual factors of hostility to technology, inertia, or passive resistance. This may be linked to the argument by Stallard (Krysa, 1998) that teachers are reluctant to embrace technology because of its potential to shorten learning time for students. Stallard contends that teachers face a number of potential interruptions during the typical hour-long class and that, consequently, the actual time spent teaching and learning is shortened significantly. On the contrary, teachers have the option of not entertaining unsolicited interruptions while using computers for the administrative aspects of their duties. It can therefore be inferred that, the personal factors of users plays a crucial role in the access issue of computer integration. The foregoing necessitates the

need to assess the role of access to widespread use of computers for performing administrative duties in schools, though at the school level in this study.

Application areas of computers in schools.

Integrating technology is what comes next after making technology available and accessible. Rusten (2002) notes that most investments in computers in schools are done to provide opportunities for students to learn about using and to enable the overall quality of teaching and learning to be improved. However, this researcher believes that teachers who are skilled in the use of computers for teaching will be skilled enough to adapt same computers to performing their administrative tasks. However, while specialized skill is required to integrate computers into curriculum, a rudiment knowledge of basic application packages of the Microsoft Office is sufficient for a successful integration of computers into administrative tasks in schools. Used wisely, IT does have the capacity to help schools become more effective administratively. Using computers and network systems can make large gains in administrative applications (NFES, 2002). Such applications can play a crucial role in making records management work better and in reducing the management burden on senior administrators so they can maintain their focus on students' education. Staff in the school system need computers to use data management systems, which in turn can have great impact on decision making, improving educational management, and ultimately student care and performance. Creating an integrated management system can benefit all users in a school through information flow among stakeholders in a school. For example, data systems that track information on individual students permit teachers to quickly check the performance of individual students on specific tasks; computer-based attendance systems allow for immediate administrative action upon a teacher recording an absence (e.g., a follow-up

call to parents). Likewise, aggregate information on absences, health condition, and test results for a given student may help a teacher make educational decisions.

Mairesse, Cette, and Kocoglu (2002) observe that in practice, the diffusion of ICT in the economy is often measured through quantitative indicator such as percentage of employees working on computer equipment in businesses, but note that this indicator does not quantify the various uses of computers in businesses. Ariyo (2002) observes that there can be no simple, precise quantitative measures by which one machine can be said to be better or worse than another, and opines that the impact of computer technology on managing school functions effectively can be assessed through its application areas. NFES (2002) argues that assessing the presence and utilization of equipment is a necessary part of evaluating the impact of technology in schools, but it is hardly sufficient, and asserts that a further step in assessment involves the extent to which applications important to schools functions are being run on this equipment. McQuarrie (Urias-Barker, 2000) notes that heavy, sustained usage, with a wide repertoire of applications, is a strong evidence for a deep and presumably positive impact. Similarly, Kanugo and Chouthoy (1998) found that IT-related failure or success is dependent on the functional areas of application. Thus, it is imperative to assess the number of administrative duties for which computers in schools are used. This study uses 10 basic regular duties (as shown in Figure 1) in schools as basis for assessment.

Funds allocation to ICT items.

Technology has and will continue to change rapidly. Those changes have lowered costs for a given level of capability but have often spurred the development of software that requires greater capabilities, and often more costly. The current decisions on the number of computers to be purchased for schools by the Governments in Nigeria more often

depend on funding than on what is best for the school, a phenomenon that has been noted internationally by Rusten (2002). So, while the importance of having technology funds in schools cannot be over-emphasized, steps need to be taken to ensure that the funds are judiciously expended. Initial purchase of the technology hardware itself is the most obvious cost of computer projects in schools, and one cost that appears to get the most attention. Although the weight of this purchase should not be slighted in times of tight school budgets, one of the lessons learned, according to Means and Oslon (1995), was the fact that the initial hardware purchase should be regarded as only a fraction of the investment required to support an effective programme. The World Bank Weekly Update of November 3, 2008 observes that total cost of ownership is often underestimated when calculating costs of ICT in education initiatives in developing countries. Estimates of initial costs to purchase equipment to overall costs over time may vary widely; typically they lie between 10 – 25% of total cost. In addition to the initial hardware, there are costs associated with software purchases, maintenance and repair, training, and system upgrades, among others. Technology cost should, therefore, be viewed as a recurring expense, because technology is central to a school's operations. The hardware and software costs of computer provision are only a part of the total costs. Housing, training, running and maintenance costs over the life of the computer are usually several times greater than equipment costs. Thus, technology implementation is not simply putting computers in schools, but also obtaining sustained funding for ongoing professional development, technical support, equipment upgrades, and regular maintenance (Gahala, 2001).

The World Bank weekly update reports findings from a recent white paper from Vital Wave Consulting, "Affordable Computing for Schools in Developing Countries: A Total

Cost of Ownership (TCO) Model for Education Officials". Among the several findings are:

1. Governments need to consider the entire cost of school computing solutions, rather than merely the initial expenses. A total cost of ownership model takes expenses. A total cost of ownership model takes into account recurrent and hidden costs such as teacher training, support and maintenance, and the cost of replacing hardware over a five-year period.
2. Support and training are recurrent costs that constitute two of the three largest costs in the total cost of ownership model. They are greater than hardware costs and much higher than software fees.
3. The total cost of ownership for different computer types and software platforms is relatively consistent.

These findings show that considerations should, therefore, be given not only to initial costs but also to a means of providing a varied and constant source of revenue that will continue into the future. According to Abumere (1978), using computers for school administration is a type of innovation that usually involves a large capital outlay and the costs associated with initial implementation constitute only one portion of the funding necessary to ensure long-term adoption. Technology budgets for initial installations of systems will likely be a dominating factor when deciding which configuration is best for a school or school systems (Rusten, 2002). Literature (Cawthera, 2001) indicates that the costs of equipment (hardware and software) may account for only 16 – 20% of the total cost. Therefore, even if there is a 40% fall in equipment costs, this can mean a much smaller reduction in the total cost of effective computer provision in schools.

Paul (1999) opines that a school that gives priority to investments in computer technologies is likely to be more technologically advanced. The 2003/2004 Information and Communications Technologies in Schools Survey in Canada (Plante & Beattie, 2004; The Daily, 2004) showed that having sufficient funding for technology was a key challenge to using ICT in secondary schools in that country. While Cawthera (2001) argues that schools which are starved of resources can derive a much greater incremental benefit from a functional computer than schools already saturated with resources, Sherry and Gibson (2002), Eniayeju and Eniayeju (2003), and Dede (2004) opine that for effective and sustained use of computers in any organization (school inclusive), there must be continuous, extensive free flow of resources and expertise throughout the system to fuel its sustainability because technology implementation requires obtaining sustained funding for ongoing professional development, technical support, equipment upgrades, and regular maintenance. Studies have shown that insufficient funds have hampered the adoption of ICT in schools (Paul, 1999; Plante and Beattie, 2004; Askar, Usluel and Muncu, 2006).

This researcher feels that it is not enough to set aside funds, such funds must be expended on items that enhance the potentials of the computers. For example, the provision of staff development programme which is a key factor in the successful implementation of ICT is often either overlooked in initial budgeting or understated with insufficient funds for the level of professional development necessary for significant benefits to occur (Paul, 1999; Ward and Parr, 2003). Personnel who will make use of the computers need to be trained and this will gulp appreciable financial resources (Alani, 2000a). However, Oxford, Rosenthal, & Urquhart (2000) observe that in the USA, only 5% of their technology budget goes towards professional development on IT. In 2001/02 academic year, ICT expenditure in UK was devoted more to hardware (55%), whereas 17% and 9% were

devoted to technical support and software respectively (Machin, McNally & Silva, 2007). If adequate funding propels flow of resources, are schools in Nigeria then setting aside any budget for this purpose? So, this study investigated those items on which ICT funds were spent.

Infrastructure.

The use of computers for administrative duties is not a new project for schools that already have computers, irrespective of the initial aim of acquiring the computers. To justify the expenses of putting computers in schools, there is need to keep them constantly in use. The type of environment for ICT facilities is an issue that will determine accessibility. Venezky and Davis note that a crucial factor contributing to the promotion of pedagogical innovations using technology is the availability of infrastructure: hardware, in terms of the number of computers in the school available for use, and the quality and functioning of equipment (speed of processors, operating systems, peripherals and access to the Internet); as well as available software (Nachmias, Mioduser, Cohen, Tubin & Forkosh-Baruch, 2004). In Ghana, some schools have successfully implemented ICT projects because they possess the infrastructure to accommodate ICT equipment donated by benevolent organization (Mfum-Mensah, 2003). By implication, therefore, the lack of appropriate environment for ICT equipment poses a problem towards successful ICT implementation. Steward (2002), through experience, recognizes infrastructure as good facilities that enhance effective use of computers. Administrative software is essential to the gathering, processing, and transmission of critical education data. However, Goos and Bennison (2006) observe that in the current context of educational policy making, it seems to be assumed that supplying schools with hardware and software will increase their use in schools. A report published by the Organization for Economic Cooperation and Development (OECD)

(Plante & Beattie, 2004) suggests that the installation of the hardware and software alone will not help to realize the full benefits of the investment in education technology. It is critical that schools have the necessary infrastructure such as electricity supply that allows sustainability, innovativeness and responsive service standards (Lagos State Government, 2004). Nachmias et al. (2004) found that factors related to infrastructure have high levels of involvement in ICT innovation.

Literature and other emerging Ghanaian case studies on ICT implementation reveal that technical support is a challenge to effective ICT implementation (Mfum-Mensah, 2003). Technology budgets for on-going support will likely be a dominating factor when deciding which configuration is best for a school or school systems (Rusten, 2002). Technology is inherently unreliable and can break down at any time. Bailey and Powell (Gahala, 2001) argue that without continuous technical support, technological integration in the school will never be satisfactorily achieved. Thus, technical support is a necessary institutional infrastructure to be put in place. Nachmias et al. (2004) found that technical support is more valuable than the amount of computers. To them this means that full support in an environment with fewer computers is more effective than having more computers without enough support. The presence of varieties of ICT equipment in schools requires the services of dedicated technology coordinators and technical support staff. Lundall and Powell (2000), Sherry and Gibson (2002), Pelgrum and Law (2003), and Schulz-Zander (2004) acknowledge that this support function is crucial to the effective use of computers and successful implementation of ICT programme. In order to sustain quality use, the initial installation of ICT needs to be followed by on-going maintenance and technical support (fixing ICT problems and answering requests from users). Naturally the amount of technical support required depends on the number of computers, the number and type of applications and the intensity of use.

Although, Sharma, Mohanty, and Mishra (2005) found that IT infrastructure (computer hardware, software, IT related books, etc) is not a major issue for the implementation of IT in schools, this researcher opines that infrastructure repair or upgrades must be responsive and well timed. Frequent occurrences of printers jammed, or insufficient computer memory will not only disrupt administrative activities but may also undermine the entire technology programme. If technology problems arise frequently and staff members have to wait hours, days, or weeks to get them resolved, they will abandon their efforts to incorporate technology. Thus, without continuous technical support, technology integration in schools will never be satisfactorily achieved. To assess the status of ICT in secondary schools in Nigeria, there is the need to assess the status of technical support and other infrastructure available to the schools for effective use of the computers placed in schools by different bodies.

Length of use of computers.

Time is one of the elements in the diffusion of innovation (Rogers, 2005). Krysa (1998) argues that integrating computers into classroom practice is a complex innovation that requires change to the whole school's practices and that this change is achieved incrementally over a long period of time. Larsen, Tonge and Roberts (2001) note that, three years is a reasonable time-span to initiate and implement long-term strategic information system (IS) programmes. Similarly, Ward and Parr (2003) observe that, most ICT strategies follow a 3-5 year cycle with goals that build on and evolve from what was learnt in previous cycles. Riffel and Levin (1997) found in a Canadian province that school administrators recognize that although the potential of computer technology might be dramatic, its application was likely to be quite conventional at the outset. Similarly, Nickerson (Riffel & Levin, 1997) observes that originally the technology may have been

adopted in order to facilitate existing function and activities, but with time, the new technology could permit the organization to do things it was not able to do before. Over four decades, and beginning with Rogers' (Sherry, 2004) seminal work on diffusion of innovations, researchers began to realize that an innovation – "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Roger, 2005; p. 12) – often requires a long period of time from the time it becomes available to the time it becomes widely adopted and used. Is the length of time computers have been placed in the selected schools long enough to facilitate their use for administrative tasks? This informs the need to find out the contribution of length of use of computers to the use of computers for administrative tasks in schools.

Quality of computers.

The continuous acquisitions of new technology by schools will produce a simultaneous stream of systems. Rusten (2002) states that different computer configurations have a direct relationship to how computers can and will be used by school administrators. Computer speed is one of many factors that can be used to assess the quality of computer and its operating efficiency (Plante & Beattie, 2004). In this study, computers are classified by processor speeds. Processor speeds are measured in Megahertz (Mhz), with each Mhz representing 1 million cycles per second (the number of times the computer processor is able to perform a task). Computers with low processor speed include those with processors in the range of 66-233 Mhz (e.g., 486, Pentium I). Computers with medium processor speed typically range in the area of 233 Mhz to 1.4 Ghz (Gigahertz) (e.g., Pentium II & III). High processor speed computers are typically available in speeds of 1.3 Ghz to 3.8 Ghz and sometimes higher (e.g., Pentium IV). A higher processor speed allows for a wider range of computer use and applications and quicker response times. One problem with low processor speed computers is that modern computer application

programs may not run on them, and if they do, they may be very slow. This is because modern computer application requires large-capacity drives, and low processor speed computers come with low-capacity drives, which are always slower than large-capacity drives that come with high processor speed. According to The Daily (2004), more than half of schools in Canadian elementary and secondary schools were equipped with medium speed processor, and nearly a third of them had low processor. Yet the teachers could conveniently use them for preparing report cards, taking attendance, and recording grades (administrative tasks), but they could not effectively engage their students in the use of ICT to enhance their learning. The reason is not far fetched: Many software applications available in schools may not require the most up-to-date operating system to operate efficiently. Similarly, most (if not all) computers in the secondary schools in Nigeria run on Microsoft Windows platform that is already equipped with Microsoft Office packages that can adequately handle basic administrative tasks in these schools.

The speed of technological developments is such that the capability and capacity of the computer purchased today is substantially greater than that purchased a couple of years ago. This does not mean that computers purchased a couple of years ago cannot perform today's tasks. Cawthera (2001) observes that advances in technology mean that schools are now purchasing even greater amounts of capacity and capability, most of which are not needed for basic educational uses. A computer is a programmable device, and so it has ability to perform any function at the discretion and innovativeness of the user. The implication of this is that, although technology constantly advances, making computers generally more capable and faster, one should not overlook the continuing usefulness of older ones, particularly in the circumstance of limited funds. Cawthera (2001) argues that with appropriate software, 386, 486, and low-end Pentium computers can accomplish the simple word processing, data processing, and Internet access functionality. Thus,

whatever is available in schools both in hardware and software are capable of accomplishing required administrative tasks. This study attempted to find out if computer quality affected the use of computers in schools for the selected administrative tasks.

Quantity of computers.

Insufficient number of computers can limit access to them. Middleton, Flores and Knapp (Krysa, 1998) view the number of available computers as an accessibility barrier. Frequent use of computers is much more likely when members of staff have access to a substantial number of them. Anderson and Ronnkvist (1999) observe that with few computers, technology has little impact on day-to-day teaching and learning. However, they remark that actual numbers of computers are not likely as meaningful as computer density that takes into accounts the number of users. Lower density levels make it impossible for users to spend much time engaged with the use of computing tools. User-computer ratios (the number of users divided by the number of computers available for use) measure how likely prospective users are to have to share a school computer. The smaller a ratio, the more computer units are available relative to the number of users. However, Pelgrum and Anderson (Nachmias et al, 2004) note that, still to many, the amount of computers within a school is an indicator of the extent of ICT implementation. Rusten (2000) submits that achieving modest gains of computerization project in the school will be unlikely if the number of computers available is so small that users can only use them a few minutes each week, noting that an insufficient number of computers can significantly reduce impact. There is therefore the need to find out how the number of functional computers will propel the administrators to use them for their tasks in order to justify the acquisition of additional computers for schools.

Rationale for acquiring computers.

Before technology can be used effectively in schools, the school needs to ensure that the technology supports the purpose for which it is acquired. Rather than using technology for technology's sake, the school can develop a vision of how technology can improve administrative skills. The goals should drive the technology use. The schools' initial task is to develop a clear set of goals and expectations. Then the school can determine the types of technology that will support efforts to meet those goals (Gahala, 2001). Hess (2004) remarks that putting computers and Internet connections across classrooms in the hope that teachers will integrate them into their lessons do not make teachers more productive or to rethink the way in which lessons are delivered. These technologies just sit at the back of the classroom unused. Cawthera (2001) argues that when computers are given to (or imposed on) schools without proper consultation, their usage and maintenance is less likely to be thought through. He argues that generally, whatever is given to a school by a central bureaucracy is valued less and it is more likely to be resented and treated as a burden. On the other hand, a competitive enterprise adopts new technologies when these enable workers to tackle new problems or to do the same thing as before, but in a cheaper and more efficient fashion. Thus rationale can inform the mode by which Governments send computers to schools.

Ward and Parr (2003) note that the most successful case studies have all had clearly defined goals for the provision of computers which have been stated at the outset of any project. These goals then provide the foundation on which to make all other decisions related to implementation of programmes on integrating computers into education. One goal may be to have competitive advantage over other schools around. Runge and Lee (2004) observe that competition increases level of innovation, while Frambach and Schillewaert (1999) posit that competitive pressures make schools within the same

locality tend to influence one another in computer usage and areas of use. Steward (2002) observes that some schools see computer facilities as a selling point for their admission exercises and yet will not provide the necessary environment needed for the full use of available computers. In addition to competition, Brynjolfsson and Hitt (Mooney, 1996) identified labour savings, improved quality, better customer service and faster response time as management's key rationale for investing in IT while Hawkridge (Paul, 1999; Lundall & Powell, 2000) observes that the belief that computers can improve administrative efficiency propels schools to acquire them. It becomes necessary, therefore, to find out if having a pre-defined goal for acquiring the computers in the schools is significant to using available computers in schools.

Skill development for staff in the use of ICT.

The potential of the computer is impressive, but human effort is needed to generate the actual effect. Schools cannot harness the potential power that computers have to offer if their staff members do not have adequate computer skills to use them. According to Yildirim (Angers & Machtmes, 2005), a large body of literature supports the idea that the biggest obstacle to teachers using technology in their classrooms is the lack of adequate teacher training. However, Angers and Machtmes (2005) observed that despite training, some teachers were still hesitant and not ready to embrace technology: those who used computers did so because of a personal interest. McQuarrie (Urias-Barker, 2000) identified the experience and knowledge of individual as explanation for the usage of computers. Computer technology is extremely dynamic and subject to continuous and rapid change. Thus, provision of training for staff in the use of computers is often a critical factor in their successful utilization. Training makes a positive difference to the attitude of those who receive it (Angers & Machtmes, 2005). However, such training cannot be satisfied with one-time training in a particular technology, and so should be an

on-going process. Scholars (Hinnant, 2002; Poku & Vlosky, 2002; Rogers, 2005; Rogers & Scott, 2005; Chapman, Garrett, & Mahlck, 2004; Pelliccione & Giddings, 2004; Stirman, Crits-Christoph & DeRubeis, 2004) observe that the drive towards adopting a new innovation is a direct product of the understanding of the relevance or otherwise of that innovation to meeting one's needs.

Dow (1973) notes that information system is only as good as the people using it and that new tools and techniques notwithstanding, expectations will not be realized unless the process of managing them is understood well enough to operate them effectively. This agrees with Morton's (2003) findings that the skill base of teachers influenced their intentions to use computers as tools for learning in Western Sydney secondary schools. Similarly, Olalere (2005) opines that successful implementation of computer education can only be assured through teachers who have acquired necessary knowledge and skills. Similarly, Collis, Kirschner and Davis (Olalere, 2005) stress that in order for teachers to implement computer education, they will need to become proficient in basic computer operations, basic applications of software such as word processing, databases, spread sheets, and graphic software. This can similarly apply to administrative use of computers in schools. Quality staff development, therefore, is essential for using computer technology as a tool for carrying out administrative duties. Sherry and Gibson (2002) assert that for systematic change (like changing from manual to automation) to be sustained, there must be continuous, extensive flow of expertise to fuel its sustainability. This is confirmed by some scholars (Grant, 1995; Long, 1994; Mandviwalla, 1994; Monteallegre, 1999; Paul, 1999; Lundall & Powell, 2000; Peled, 2000; Tettey, 2000; Markus, 2001; Blair, 2002; Ekireghwo, 2002; Hinnant, 2002; Sherry & Gibson, 2002; Ezeliora, 2003; Kalu & Ekwueme, 2003; Kenaroğlu, 2004; Runge & Lee, 2004; Schulz-Zander, 2004; Thong & Yap, 2004) who found a relationship between computer literacy

and effective use of computer technology. However, providing sufficient development and training to give staff skills and confidence in the use of technology is widely viewed as an ongoing challenge to schools (NFES, 2000).

Alani (2000b) argues that the reason why records are badly kept in a good number of schools is because of inadequate training of school administrators and that this is why many school administrators find it difficult to give accurate information when such is required by the education authorities (Alani, 1992). Thus, Ward and Parr (2003) suggest that the provision of professional development for staff is a key ingredient in the successful implementation of ICT. Professional development represents learning activities of all kinds that prepare staff to use technology in the school setting. Muncu (Askar, Usluel and Muncu, 2006) notes that one of the most critical obstacles to diffusion of ICT is insufficient in-service training. The World Bank (Kalu and Ekwueme, 2003) remarks that lack of awareness about the capabilities of the technology and absence of skills to use ICT applications represent significant obstacles to adoption, even when the physical infrastructure is available.

Paul (1999) observes that despite having access to computers in schools, many teachers do not use them regularly because they feel inadequately prepared to use them while some others are unaware of the resources the technology could offer them as school administrators. The Lagos State Government (2004) notes that the greatest obstacle to effective use of ICT in the workplace is the low capacity of the personnel available for its use. Josiah, Pam and Okooboh (2003) found that the skilled teachers required to use the computers in Plateau State secondary schools were inadequate, while Olalere (2005) found that over 60% of teachers in Nigerian secondary schools did not have minimum experience in the use of computers in basic computer operations, and in the use of

application software. There is, therefore, the need to find out the computer skill development programmes available to school personnel.

To the best knowledge of this researcher, no study has been conducted on the use of computers for secondary school administration in Nigeria. This study will, therefore, fill this gap in the literature.

CHAPTER THREE

RESEARCH METHODOLOGY

Research Design

The study adopted the descriptive survey design based on questionnaires and checklists of computers and related infrastructure to assess the status of administrative use of computers in secondary schools and obtain possible explanations on how the school characteristics facilitate or inhibit the use of the computers. Best and Kahn (Anumnu, 2006) note that descriptive research is used to obtain information concerning the current status of the phenomenon to describe what exists with respect to variables or conditions in a situation. The survey method describes the status quo and so may not justify causal statements. Therefore, the study did not look out for cause and effect, but it assumed a priori knowledge of the problem being investigated.

Population of the Study

The study covered both public and private secondary schools that had acquired computers for at least five years in South-West Nigeria comprising of Lagos, Oyo, Ogun, Ekiti, Ondo and Osun States. This researcher found, on inquiry, that in Lagos State, the civilian administration embarked upon a statewide computerization project – the Global Computerization Programme (GCP) in 1999. In implementing the project, the State Government established a full-fledged Ministry of Science and Technology to oversee the implementation and deployment of ICT initiatives of the Lagos State Government. Educational use of ICT was a major component of this project with the intention of putting computers in all public secondary schools. The state started with two public secondary schools per local government area as pilot schools, culminating in a total

number of 40 schools from the 20 recognized local government areas of the state. These were the participating public secondary schools in Lagos State.

The Ogun State 'Computer-In-School' Programme, introduced in 1992 by the Ogun State University (Now Olabisi Onabanjo University) Consultancy Services, started with 18 pilot schools before the programme became moribund. A new programme, tagged 'Computer Education Programme', is being coordinated at present by the Science and Technology department of the Ministry of Education, Science and Technology. Under this new dispensation, schools are given the freedom to choose either to participate or not in the programme. Any interested school only needs to signify in writing. At the time the study was conducted, 105 public secondary schools (Junior and Senior) were participating in the programme. These constituted the participating schools in this study in Ogun state.

For private schools in Lagos and Ogun states, there was no official list of schools with computers. The researcher sent letters to the private schools in both states to enquire from them whether they had computers. Out of the number (46 and 39 in Lagos and Ogun States respectively) that replied in the affirmative, 32 private schools in Lagos State and 27 in Ogun State had acquired computers for more than five years. These constituted the sample frame for private schools.

The population for the study included principals, vice principals (administrative and academic), all heads of departments, teachers, bursars, accounting support staff, and administrative support staff in the sampled schools.

Sample and Sampling Procedure

A simple random sampling of two states out of the six states in South West Nigeria resulted in Lagos and Ogun States respectively. The public schools selected were those participating in the 'Computer-in-Schools Programme' in Lagos and Ogun States respectively. A school was considered eligible if it had acquired computers for at least five years. Schools that met this criterion constituted the sampling frame.

In Lagos State, the 20 local government areas (LGAs) were grouped into six administrative districts. Taking each of the districts as a stratum, random sampling technique was used to select two LGAs from each of the districts, resulting in a total of 12 LGAs selected. Alimosho and Ifako LGAs were selected in District 1, Kosofe and Shomolu in District 2, Ibeju-Lekki and Lagos Island in District 3, Lagos Mainland and Surulere in District 4, Badagry and Amuwo-Odofin in District 5, and Ikeja and Mushin in District 6. Since only two public schools were supplied with computers in each of the 20 LGAs in the state, the two public schools in each of the selected LGAs were purposively included in the sample, thus bringing the total number of public schools in the sample to 24. The 24 schools selected constituted 60% of the 40 public schools supplied with computers. All the 40 schools had acquired computers for at least five years.

In Ogun state, participation of schools in the 'Computer-in-School Programme' is voluntary. Consequently, not all the local government areas had schools participating in the programme. Seventy-three out of 105 public schools participating schools had acquired computers for more than five years. Sixty percent (approximately 44 schools) of the 73 public schools were randomly selected.

Because the sample frame for private schools was larger in Lagos State than in Ogun, 16 schools were randomly selected in Lagos State, while 15 were randomly selected in Ogun State. All random samplings were done through 'hat and draw' method.

Research Instruments

Three sets of questionnaires – "Computer Inventory Questionnaire (CIQ)" (a check list of quality and quantity of computers and other accessories), "Computer Use Assessment Questionnaire (CUAQ)" (which contains items for measuring access to computers, application areas of computers, fund allocation to ICT items, available infrastructure, length of use of computers, rationale for acquiring computers, and skill development in the use of ICT), and Attitude Scale were adapted from instruments developed by Grant (1995), Long (1994), Lundall and Powell (2000), and Tettey (2000). The researcher visited Adesoye International College, Offa and Loyola Jesuits, Abuja. These schools use ICT for school administration extensively. The computers and related technologies on ground, the application areas of these technologies, and other information gathered during the visits to the two schools helped the researcher to determine the items to include in CIQ and CUAQ respectively.

Validity of the Instruments

In order to ascertain that the Attitude Scale and CUAQ measured the attributes they were intended to measure, experts in the field scrutinized them. Their observations and suggestions were integrated into the final drafts of the questionnaires, thus ensuring their content validity. The CIQ was essentially a checklist of quality and quantity of computers and infrastructure on ground and so its validity is guaranteed because these items are reported as they are. The Attitude Scale and the CUAQ comprised items from already

validated scales based on instruments used in previous studies (Grant, 1995; Long, 1994; Lundall & Powell, 2000; Tettey, 2000). Though the studies on which the Attitude scale and the CUAQ were based focused on the use of computers for teaching and learning, many of the items on these instruments were relevant to school administration and these were rephrased to address the purpose of the study, thus ensuring their face validity. To ascertain construct validity of the Attitude Scale (AS) and CUAQ, correlation matrix was produced for correlation between items measuring the same variable (for convergence) and between measures of different variables (for discrimination). All the correlation coefficients for convergence measure were greater than .80, while the coefficients for measure of discrimination were less than .20 (see Appendix D). Thus the correlation matrices provided evidence for construct validity for AS and CUAQ respectively.

Reliability of the Instruments

The Computer Inventory Questionnaire was a checklist requiring information on the number of functional computers, the softwares used on them, and inventory of other technology items on ground. Since these data were captured as they were and cannot be changed, they are considered reliable. Both Brown (2002) and Streiner (2003) admit that though Split-half adjusted, Kuder-Richardson formulas 20 and 21 (K-R20 and K-R21), and Cronbach alpha are the most familiar internal consistency reliability estimates, K-R20 and Cronbach alpha are the most frequently reported. This researcher used Cronbach's alpha (α) for the reliability measure of the CUAQ and the Attitude Scale. Cronbach's alpha was preferred because Streiner's (2003) study on measures of internal consistency established that Cronbach's alpha is the most widely used index of the reliability of a scale. According to Streiner (2003), α is the only reliability index that does not require two administration of the scale, or two or more raters and so can be

determined with much less effort than test-retest or inter-rater reliability. Streiner (2003) also reports that Cronbach generalized KR-20 into coefficient α as far back as 1951. The Cronbach's coefficient for items of the CUAQ and AS are displayed in Table 1.

Table 1

Results of Reliability Tests for Computer Use Assessment Questionnaire and Attitude Scale

Instrument	Variable	Mean	Standard Deviation	Reliability Coefficient
Computer Use Assessment Questionnaire (CUAQ)	Access to computers	1.2	1.99	0.89
	Application areas	8.4	1.92	0.90
	ICT funds	26.6	2.48	0.87
	Infrastructure	2.25	3.42	0.79
	Length of use	4.6	2.48	0.87
	Rationale for acquiring computers	2.75	3.47	0.79
	Skill development	2.47	3.20	0.84
	Knowledge of use	2.0	1.92	0.90
Attitude Scale	Staff attitude to administrative use of computers	38.4	2.49	0.85

These coefficients are considered to be high by Morton (2003), Santos (1999) and Streiner (2003). However, it can be observed that the standard deviation (2.49) of the attitude scale relative to its mean (38.4) is small; similarly the standard deviation (2.48) of ICT funds relative to its mean (26.6) is small. This implies that these measures are more consistent than the other measures in Table 1.

Procedure for Data Collection

All the questionnaires were administered by the researcher and trained research assistants in the two states. There were a total of 14 research assistants (six and eight for Lagos and Ogun States respectively). These research assistants had always been involved in data

collection exercises for the Federal Ministry of Education in the past. Table 2 displays the study variables and how they were measured.

Table 2

How Study Variables were Measured

Variable	Type of Information Required	Number of Items	Instrument
Attitude to administrative use of computers	Respondents' feelings about administrative use of computers	15	Attitude Scale
Access to computers	Location of computers in schools; whether school placed restriction on computer use; categories of staff allowed to use computers	3	Computer Use Assessment Questionnaire (CUAQ)
Application areas of computers	Duties staff use computers for in the school	1	CUAQ
Provision for ICT budget	Does school have specific budget for computers;	2	CUAQ, CIQ
ICT items for which budget was used	Items budget was spent on in the last 2 years;	1	CUAQ
Infrastructure	Type of softwares used by school; availability of electricity, UPS, telephone, administrative software, up-to-date anti-virus; number of printer; provision of maintenance and technical support	4	Computer Inventory Questionnaire (CIQ), CUAQ
Length of use of computers	For how long respondent has been using computer	1	CUAQ
Quality of computers	Categories of Pentium computers (Pentium I and below, Pentium II/III, Pentium IV)	1	CIQ
Quantity of computers	Number of functional computers by Pentium category	1	CIQ
Rationale for acquiring computers	Factors that motivated the school to acquire computers; how school eventually adopted computers	2	CUAQ
Staff skill development in ICT use	Spread of computer skilled personnel among departments; how school ensured maximum use of computers in the school	2	CUAQ
Knowledge of use	Rating by respondent of his/her computer expertise; the type of applications respondent is skilled in	2	CUAQ
Facilitators of administrative use of computer	Factors facilitating use of computers; respondents to suggest facilitating factors	2	CUAQ
Inhibitors of administrative use of computer	Factors inhibiting use of computers; respondents to suggest inhibiting factors	2	CUAQ

Method of Data Analysis

Both descriptive and inferential statistics were used for data analyses. Mean, percentages, selectivity indices and Gini coefficients were used. Research questions one, three, four, five, six and eight were answered using descriptive statistics while research questions two and seven were converted to hypotheses. The *t*-test for independent samples was used to test hypothesis one, while Analysis of Variance (ANOVA) was used to test hypotheses two, three and four. The key statistic in ANOVA is the F-test of difference of group means, testing if the means of the groups formed by values of the independent variable are different enough to have occurred by chance. If the group means do not differ significantly, then it is inferred that the independent variables did not have an effect on the dependent variable (DeCoster, 2002). By implication, if the group means differ significantly, then it is inferred that the independent variables had an effect on the dependent variable. All hypotheses were tested at the 0.05 level of significance. Data ranking, percentages and frequencies were used to describe results. To answer research questions one and three, the researcher adapted the standard methodology for assessing the distribution of income – the Gini coefficient and selectivity index. The most widely used measure of inequality is the Gini coefficient (Plante & Beattie, 2004). The Statistical Package for Social Sciences (SPSS) was used for raw data processing and analysis, while spreadsheet (Microsoft Excel) was used to generate selectivity indices and Gini coefficients.

Gini Coefficient

The Gini coefficient is a measure of inequality of a distribution. It is used to indicate the concentration of almost any phenomenon across any kind of grouping. Gini coefficient shows whether there is inequality in distribution of a variable or not. It tells how evenly

the variable is spread. The lower the Gini coefficient, the more evenly spread the variable. In other words, a low Gini coefficient indicates more equal distribution, while a high Gini coefficient indicates more unequal distribution. The Gini coefficient ranges from 0 to 1; 0 represents perfect equality (that is, everyone has the same amount of factor under consideration) and 1 corresponds to total inequality (that is, one person has all the variables, while everyone else has zero of the variable). Although the level of inequality is reflected in the value of the Gini coefficient itself (for example, a value very close to 0 will represent a low level of inequality), the interpretation of the coefficient is usually done in comparative terms, by contrasting the calculated value of a factor to that of other factors or school categories (that is, a coefficient of 0.2 will represent a lower level of inequality than a coefficient of 0.4).

Selectivity Index

Selectivity indicators are designed to measure disparities (Carron & Chau, 1981). Selectivity index shows who has more or less of what. It tells how evenly the variable is spread. This indicator shows that a school category with index greater than 1 has more of the variable under consideration. Similarly, selectivity indices less than or equal to 1 imply less or equal quantity of the variable or factor under consideration respectively.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents data analysis and findings of the study. The data collected for the study was analyzed to answer the research questions and to test the research hypotheses. The results presented in this study emerge from survey of 68 public and 31 private secondary schools respectively. Thus the results are suggestive of further areas of investigation rather than generalizable to the experiences of secondary schools.

Demographic Characteristics of Participants

Table 3 displays the demographic characteristics of participants. A total of 1090 and 429 administrative staff of public and private secondary schools respectively participated in the study. Of these, 41.65% were male and 58.35% were female in the public secondary schools, while 56.18% and 43.82% were male and female respectively in the private secondary schools. In the public secondary schools, a greater percentage (50.65%) of participants were within the age range of 40 – 49 years, while 53.85% of private schools participants were within the age range of 30 – 39 years. Most participants' highest qualification was First Degree with 55.14% and 67.76% from public and private secondary schools' participants respectively. Most participants from the public schools were head of department (34.2%), while in the private schools a higher percentage (31.00%) of the participants were year tutors. A greater percentage of the participants were maximum three years old in their present status in the schools (57.34% and 61.31% for the public and private school respectively).

Table 3

Demographic Characteristics of Participants

Category	Public		Private	
	N	%	N	%
Gender				
Male	454	41.65	241	56.18
Female	636	58.35	188	43.82
Age				
20 – 29	69	6.36	16	3.73
30 – 39	351	32.38	231	53.85
40 – 49	549	50.65	177	41.26
50 years and above	115	10.61	5	1.16
Teachers Highest Qualification				
Masters	81	7.43	37	8.64
Post Graduate Diploma	99	9.08	39	9.11
First Degree	601	55.14	290	67.76
Higher National Diploma (HND)	46	4.22	19	4.44
Below First Degree/HND	263	24.13	43	10.05
Respondent's Status				
Principal	114	10.46	29	6.76
Vice Principal	171	15.69	95	22.14
Head of Department	373	34.2	95	22.14
House Master	57	5.23	10	2.33
Bursar	67	6.15	19	4.43
Form Supervisor	10	0.92	0	0.00
Year Tutor	249	22.84	133	31.00
School Counselor	0	0.00	10	2.33
Secretary	30	2.75	38	8.86
Clerical Officer	19	1.74	0	0
Length of stay in present status				
1 – 3 years	625	57.34	263	61.31
4 – 7 years	246	22.57	117	27.27
8 – 12 years	133	12.20	49	11.42
13 years and above	86	7.89	0	0

Key

N = number of respondents to CUAQ and Attitude Scale

Answers to Research Questions

Question 1.

What disparities exist among secondary schools' characteristics, such as, attitude to the use of computers, access to computers, length of use, rationale for acquiring computers, and provision for ICT budget?

Tables 4 to 7 show answers to research question one.

Table 4 contains the mean value for each item on the attitude scale measuring the attitude of school administrators to the use of computers for administrative tasks. It can be observed from the table that private schools had more mean responses (80%) that are greater than 3.0 (agree) than public schools with about 67%. This shows that private schools administrators had a higher conviction that computers would facilitate administrative tasks than administrators of public schools. The low mean (1.87) response obtained for public school administrators for item number 8 is an indication that these administrators have not really been using computers as opposed to private school administrators with a mean response of 3.61 for the same item.

However, the high mean score of 3.76 obtained for public school administrators for item 7 may be a reflection of their belief since this does not reflect in their practice. On the other hand, the lower mean value scored by private school administrators on the same item may be an indication that though private school administrators appear to use computers more than public school administrators, the former are not using networked computers that allows interaction among users of the computers.

On the average, responses show that computers are useful administrative tools. However, item 13 shows that both public and private school administrators are not very confident working with computers as indicated by low mean scores of 2.20 and 2.84 respectively.

Table 4

Attitude items to which school administrators responded

Item No	Questions	Public N= 1090			Private N= 429		
		Mean	SD	SE	Mean	SD	SE
1	I think using a computer would be very hard for me	3.58	0.558	0.017	3.61	0.555	0.027
2	The challenge of solving problems with computers does not appeal to me	3.57	5.843	0.177	3.20	12.139	0.586
3	Knowing how to use computers is a worthwhile and necessary skill	2.65	5.937	0.180	3.06	0.509	0.025
4	I think working with computers would be enjoyable and stimulating	2.53	0.937	0.028	2.18	0.513	0.025
5	Working with a computer makes me very nervous	4.54	9.992	0.303	3.53	0.582	0.028
6	Using computers for school administration would be good because I would have more time for individual contact with staff and students	2.44	8.332	0.252	3.37	13.210	0.638
7	Frequent use of computers would allow easy interaction among members of staff	3.76	13.990	0.424	1.75	0.741	0.036
8	Computer-assisted administration would help keep me on task	1.87	29.653	0.898	3.61	0.601	0.029
9	I think I could be a more effective administrator if I didn't rely on computers very much	3.57	5.842	0.177	3.86	13.816	0.667
10	Using computers would be bad because they would intimidate me	3.93	5.810	0.176	3.56	0.599	0.029
11	Using computers would be bad because they stifle creativity	3.78	5.815	0.176	4.27	9.225	0.445
12	Computers make me feel uneasy and confused	4.20	8.175	0.248	4.46	9.197	0.444
13	I have a lot of self-confidence when it comes to working with computers	2.20	5.905	0.179	2.84	11.846	0.555
14	Having members of staff use computers to interact with one another would be a waste of time	3.25	29.759	0.901	3.18	0.505	0.024
15	Learning about computers is a necessary subject for all prospective school administrators	3.57	11.743	0.356	3.77	0.578	0.028

Key

N = number of respondents (administrative staff)
SD = Standard Deviation
SE = Standard Error of Mean

Table 5 shows the level of administrators' agreement with the attitude items. Attitude was measured on a 4-point scale and the distribution is as shown in the table. The average response for all schools was 3.32. The table shows that a total of 1312 (86.37%) out of 1519 respondents agreed to the usefulness of computers in carrying out administrative duties in secondary schools, with an average score of 3.32 on the attitude scale.

Table 5

Administrators' attitude to the use of computers for school administrative duties

Scale	Response	N	Percentage (%)
Public Schools:			
4	Strongly Agree	497	45.65
3	Agree	438	40.21
2	Disagree	142	13.04
1	Strongly disagree	13	1.1
Total		**1090**	**100**
Average response	= **3.30**		
Private Schools:			
4	Strongly Agree	234	54.54
3	Agree	143	33.33
2	Disagree	20	4.55
1	Strongly disagree	32	7.58
Total		**429**	**100**
	Average response = 3.35		
All Schools			
4	Strongly Agree	731	49.37
3	Agree	581	37.34
2	Disagree	162	9.49
1	Strongly disagree	45	3.80
Total		**1519**	**100**
	Average response = 3.32		

Key

N = number of respondents (administrative staff)

Private schools' administrators with an average attitude scale of 3.35 showed a slightly higher positive attitude to the use of computers than public schools with an average score of 3.30. Though the scores are closer to 'agree' than to 'strongly agree', they give enough

reason to conclude that secondary school administrators had a general positive attitude to the use of computers for administrative tasks.

Table 6 shows the differences in school characteristics such as rationale for acquiring computers, length of use of computers by the schools, and staff access to computers after school hours. The low mean scores on rationale for acquiring computers, and length of use of computers for all schools suggest that schools hardly had a prior set goals before acquiring computers, and did not use them for the length of time that they were acquired.

Table 6

Average scores on Rationale for Acquiring Computers, Length of Use of Computers, and Access to Computers after School Hours in Sampled Secondary Schools

School Characteristics	N	Mean	Std. Dev	Std. Error of Mean
Public Schools:				
Rationale for acquiring computers	1090	3.51	1.01	.031
Length of Use of Computers by School	1090	3.10	6.65	.201
Staff Access to computers after school hours	1090	1.61	6.68	.202
Private Schools:				
Rationale for acquiring computers	429	4.17	11.253	.543
Length of Use of Computers by School	429	4.81	10.01	.483
Staff Access to computers after school hours	429	11.4	29.5	.424
All Schools:				
Rationale for acquiring computers	1519	3.99	9.55	.245
Length of Use of Computers by School	1519	4.33	9.22	.237
Staff Access to computers after school hours	1519	8.64	25.63	.658

Key

N = number of respondents (administrative staff)
Std. Dev = Standard Deviation
Std. Error of Mean = Standard Error of Mean

The table shows that fewer public schools (mean value 3.51) compared to private schools (mean value 4.17) had rationale, and the rationale for acquiring computers in public schools appear to be similar as indicated by the standard deviation of 1.01, while

rationale varied widely among private schools as indicated by the standard deviation of 11.253.

More private schools had used computers longer than public schools with mean values of 4.81 and 3.10 respectively. However, length of use varied more widely among staff of private schools than among public schools' as indicated by the standard deviations of 10.01 and 6.65 respectively. Access to computers after school hours varied more widely for staff of private schools (standard deviation = 29.5), though more (mean = 11.4) than for public schools (mean = 1.61).

Table 7

Selectivity Index and Gini Coefficient for Provision for ICT in Secondary Schools' Budgets in Lagos and Ogun States

School Category	Sampled Schools	Schools with ICT Budget	% of schools with ICT budget	Selectivity Index	Gini Coefficient
Public:					
Lagos State	24	2	8.3	0.0	0.00
Ogun State	44	17	38.6	0.0	0.00
Private:					
Lagos State	16	9	56.3	2.40	0.25
Ogun State	15	8	53.3	3.94	0.47

Gini coefficient shows whether there is inequality in distribution of a variable or not (i.e., it tells how evenly the variable is spread), while selectivity index shows who has more or less of what. The lower the value of Gini coefficient, the lower the inequality, and the more the spread of the variable being measured. The higher the value of selectivity index, the more the variable being measured. Table 7 shows that public schools (Lagos and Ogun states) in general did not have budgetary provisions for ICT as indicated by

selectivity index of 0.0 respectively, while private schools had budgetary provisions for ICT as indicated by the selectivity indices of 3.94 and 2.40 for Ogun and Lagos States respectively, with Ogun State private secondary schools making more provision than Lagos State private secondary schools. However, budgetary provision is more evenly spread among Lagos State private schools as indicated by the Gini coefficient of 0.25.

It can thus be inferred that there is perfect equality in non-budgetary provision for ICT among public schools in Lagos and Ogun states respectively. There is lower inequality in budgetary provision among Lagos State private schools (Gini coefficient = 0.25) than among Ogun State private schools (Gini coefficient = 0.47).

Question 3.

What disparities exist among secondary schools in quantity of functional computers, and proportion of staff knowledgeable in computer usage?

Tables 8 to 10 present the answers to research question three. The tables show the selectivity indices and Gini coefficients for the variables under consideration in the question. In Table 8, disparities can be observed within the four groups of schools (public/private schools in Lagos State, public/private schools in Ogun State). The table shows that there is inequality in distribution of functional computers among all the schools (public and private) across the two states (Lagos and Ogun) because the Gini coefficient for each of the four school categories is greater than zero. The table also indicates that inequality was less among private schools in general as indicated by the Gini coefficients of .384 and .392 than among public schools as shown by the Gini coefficients of .408 and .442.

Table 8

Selectivity Index and Gini Coefficients for Inequalities in the Quantity of Functional Computers in Secondary Schools

School Category	Number of Schools	N	Mean X	Sd	Selectivity Index	Gini coefficient
Public:						
Lagos State	24	187	7.8	23.2	1.497	0.408
Ogun State	44	285	7.3	25.4	0.846	0.442
Private:						
Lagos State	16	128	8.0	16.4	1.538	0.384
Ogun State	15	66	4.4	19.2	0.750	0.392

Key

N = number of functional computers in the schools
Sd = Standard Deviation

Thus, computers are more evenly distributed among private schools than among public schools. It can be observed from the table that schools in Lagos State (public and private) have more functional computers (selectivity indices are 1.497 and 1.538 respectively) relative to schools in Ogun State (public and private) with selectivity indices of 0.846 and 0.750 respectively.

Table 9 shows the typical number of staff per computer. Actual numbers of computers are not as meaningful as measures of computer density that take into account the number of staff. Hence, the median of staff per computer is used to show staff access to computers in terms of the number of staff that compete for use of one computer. Unlike means, which may be influenced by higher values, median of staff per computer ratio indicates the typical number of staff per computer.

Table 9

Average number of computers and staff – to – computer ratio in Secondary Schools in Lagos and Ogun States

School Category	Average Number of Computers	Average Number of Staff	Number of Staff per Computer (median)
All Schools	7	55	5.5
Pubic Schools	6.1	89	6.9
Private Schools:			
Low-brow	4.6	14	3.1
Medium-brow	9.0	17	4.6
High-brow	13.6	28	5.1

Lower density levels make it impossible for prospective users to spend much time engaged in learning with the use of computing tools. Table 9 shows that the typical number of staff per computer was generally lower in private schools (3.1, 4.6, and 5.1 for Low-, Medium-, and High-brow schools respectively) than in public schools (6.9). It can thus be inferred that private school administrators had a better access to computers than public schools'.

The number of computers varied among private schools' categories. Private schools were classified as Low-, Medium-, and High-brow schools, based on the respective fees charged per term. The researcher classified Low-brow schools as those schools charging N10,000.00 or less as school fees per term, Medium-brow private schools as those that charged more than N10,000.00 up to a maximum of N20,000.00 per term, while High-brow private schools as those that charged above N20,000.00 per term. On the average, High-brow schools had more computers than any of the medium- and low-brow schools. This suggests that High-brow schools invested more in computers than any of the other groups. The reason is not far fetched: they were richer by reason of the revenue from

school fees charged. This phenomenon is also a pointer to the fact that fund is a vital factor in computer acquisition and maintenance.

Table 10 shows the disparities in proportion of staff knowledgeable in computer usage among secondary schools in Lagos and Ogun States.

Table 10

Selectivity Index and Gini Coefficients for Proportion of Staff knowledgeable in Computer Usage in Lagos and Ogun States

School Category	Sampled Schools	Staff Strength	Selectivity Index	Gini Coefficient
Public:				
Lagos State	24	1845	1.151	0.0020
Ogun State	44	762	0.470	0.0228
Private:				
Lagos State	16	1287	1.404	0.0362
Ogun State	15	864	1.110	0.1190

The selectivity indices of 1.151, 1.404, and 1.110 indicate that Lagos State secondary schools (public and private) and Ogun State private secondary schools respectively had a higher proportion of staff knowledgeable in computer usage. Ogun State public schools had less proportion of staff knowledgeable in computer usage (selectivity index was 0.470). However, there was a lower inequality of proportion of staff knowledgeable in computer usage among Lagos State public schools (Gini coefficient = 0.0020) than among private schools (Lagos and Ogun states) with selectivity indices of 0.0362 and 0.1190 respectively. Thus Lagos State schools had more staff knowledgeable in computer usage, and they are more evenly spread. Inequality in proportion of knowledgeable staff was higher among Ogun State private schools (as indicated by the Gini coefficient of 0.1190) than among Lagos State public, and private schools and Ogun State public school as indicated by Gini coefficients of 0.0020, 0.0362, and 0.0228 respectively. In summary,

the proportion of staff knowledgeable in computer usage is more evenly distributed among Lagos State public secondary schools as indicated by the Gini coefficient of 0.0020 than among other school categories (Ogun State public, Lagos State private, and Ogun State private schools with Gini coefficients of 0.0228, 0.0362, and 0.1190 respectively). This proportion is far less evenly distributed among Ogun State private schools as indicated by the highest Gini coefficient (0.1190).

Question 4.

To what extent do schools differ in skill development programme for staff in basic administrative application packages, quality of functional computers, and infrastucture?

Tables 11 to 13 contain answers to research question four. Table 11 shows that more staff attended training in e-mail/internet browsing (mean = 51.28), basic computer operations (mean = 42.62), accounting package (mean = 38.16), database management (mean = 34.33), but fewer staff attended statistical package training (mean = 6.76).

Table 11

Differences in the Staff Skill Development Programmes in Basic Administrative Application Packages in Secondary Schools in Lagos and Ogun states

Staff skill development in basic application packages	N	Mean	Standard Deviation	Standard Error of Mean
Basic Computer Operations (Word processing and spreadsheet)	350	42.62	1.82	0.10
Database Management	115	34.33	19.63	1.83
Statistical package	289	6.76	27.12	1.60
Accounting Package	315	38.16	27.17	1.53
E-mail/Internet browsing	64	51.28	27.22	3.40

Key

N = Number of administrative staff that responded to the questions

However, the number of staff that attended training programmes in statistical package varied more widely as indicated by the large size of the standard deviation (27.117) relative to the mean (6.76).

Table 12

Differences in the Quality of Functional Computers in Secondary Schools in Lagos and Ogun States

Computer quality	N	Mean	Standard Deviation	Standard Error of Mean
Low processor speed	69	3.30	5.157	.621
Medium processor speed	72	17.33	24.84	2.93
High processor speed	33	1.64	31.25	5.44

Key

N = Number of computers

Computer speed is one measure of quality of computer. It shows the quickness of the central processing unit (CPU) (Fasoldt, 1990). Computer speeds are measured in Hertz (Hz). This refers to the speed of the clock driving the computer's processor (Tolman, 2002). Mega-Hertz (MHz) means million cycles per second. So, a computer that has a 500 MHz clock is doing something 500 million times per second. A 1GHz computer does something 1 Billion times per second. In general, a higher processor speed can accommodate large capacity drives which allow for a wider range of computer use and applications, and quicker response times than a lower processor speed. In this study, low processor speed computers are Pentium I and below, medium processor speed computers are Pentium II and/or III, while high processor speed computers are Pentium IV. Table 12 shows that there are more medium processor speed computers in the schools than computers with low or high processor speed as indicated by the mean values of 17.33,

3.30 and 1.64 respectively. The quality of computers with medium processor speed and high processor speed varied widely as indicated by the standard deviations of 24.84 and 65.33 respectively, with a wider variation in high processor speed.

Table 13

Differences in Infrastructure in Secondary Schools in Lagos and Ogun States

Infrastructure	N	Mean	Standard Deviation	Standard Error of Mean
Electricity	913	1.04	.197	.065
Uninterrupted Power Supply (UPS)	508	1.28	.452	.020
Technical support	131	1.48	.503	.044
Administrative Software	89	1.52	.503	.053
Up-to-Date Anti-Virus	174	1.56	.500	.038
Softwares purchased off the shelf	135	1.48	.503	.043
Customized in-house developed Softwares	50	1.70	.464	.305
Microsoft Office Application Packages	910	1.22	.415	.050

Key

N = Number of administrative staff that responded to the questions

Table 13 shows that schools are generally poor in relevant infrastructure that could enhance effective use of computers as indicated by the generally low mean scores and supported by their respective low standard deviations for all infrastructure. The low values for the standard error of means indicate that the table most likely reflects the true situation concerning infrastructure.

Question 5.

What factors enhance and inhibit the use of computers in school administration?

Respondents' answers to the questions on factors that could enhance or inhibit the use of computers in carrying out the administrative tasks were used to answer this question. Tables 14 and 15 show the ranking of the responses based on the frequency of their occurrences.

Table 14

Factors Enhancing Computer Use for Administrative Tasks in Secondary Schools

Factors	Frequencies	Rank	Mean	SD	SE
Extensive computer facilities within the school	98	1	3.84	15.393	1.555
Strong financial position of the school	67	2	4.03	15.362	1.877
ICT training package for staff	67	2	4.03	15.362	1.877
Awareness of new technological development	66	4	4.04	15.361	1.891
Strong planning capacity of the school	63	5	4.06	15.358	1.935
Strong technical support	59	6	4.08	15.354	1.999
Principal's personal interest	58	7	4.09	15.352	2.016
Availability of other information technology equipment (e.g., projectors, compact disk)	52	8	4.13	15.346	2.128
Need for uniqueness and innovation	51	9	4.13	15.345	2.149
Pressure from competitors	47	10	4.16	15.341	2.235
Location of the school	45	11	4.17	15.338	2.286
Strong top management support	37	12	4.22	15.362	2.525
Management style	34	12	4.24	15.326	2.628
Need for quality assurance	12	14	4.38	15.300	4.417

Key

N = number of respondents (administrative staff)
SD = Standard Deviation
SE = Standard Error of Mean

Table 14 shows that availability of extensive computer facilities within the school was the most important factor that facilitated the use of computers for administrative tasks, though it has the lowest mean (3.84) value. Strong financial position of the school and ICT training package for staff were ranked equally as the second most important facilitating factors. Awareness of new technological development, strong planning capacity of the school, strong technical support and principal's personal interest were factors with slightly high frequencies. Using the median of the frequencies (55) as the basis for determining the strength of factors enhancing administrative use of computers, all factors with frequencies above 55 can be considered as stronger facilitators than factors with frequencies below 55.

However, the large size of the standard deviations relative to their respective mean values shows that there is wide variation in responses. This shows a lack of consistency in the responses. Moreover, the differences in the mean values are quite marginal. Thus, there is no strong support for the ranks of the factors as representing their relative facilitating influence on administrative use of computers.

Table 15 shows factors inhibiting administrative use of computers as suggested by the respondents. Using the median of the frequencies (58.5) as the basis for determining the strength of factors inhibiting administrative use of computers, all factors with frequencies above 58.5 can be considered as stronger inhibitors than factors with frequencies below 58.5.

However, the large size of the standard deviations relative to their respective mean values shows that there is wide variation in responses. This shows a lack of consistency in the responses. Moreover, the differences in the mean values are quite marginal. Thus, there is

no strong support for the ranks of the factors as representing their relative inhibiting influence on administrative use of computers.

Table 15

Factors Inhibiting Computer Use for Administrative Tasks in Secondary Schools

Factors	Frequencies	Rank	Mean	SD	SE
Lack of constant electricity supply	89	1	6.95	22.855	2.423
Lack of appropriate skill development programme	78	2	7.42	22.750	2.576
Financial constraint	75	3	7.22	22.787	2.631
Fear by staff that computers may take over their jobs	59	4	7.45	22.729	2.959
Location of computers	58	5	7.15	22.806	2.995
Lack of knowledge of use of computers	42	6	7.22	22.788	3.516
Constant break down of computers	39	7	7.33	22.761	3.645
Low perceived usefulness of computers	37	8	7.37	22.751	3.740

Key

N = number of respondents (administrative staff)
SD = Standard Deviation
SE = Standard Error of Mean

Though lack of constant electricity ranked first in Table 15, it can be observed from Tables 14 and 15 that for both facilitators and inhibitors, the emphasis is predominantly on issues concerning knowledge of use of computers and budgetary provisions because they maintain constant positions 2nd and 3rd in ranks in the two tables.

Question 6.

What disparities exist in the items ICT budget are used for among the secondary schools?

Table 16 contains answers to research question 6. The table shows that schools did not generally spend much on ICT related items listed in the table as indicated by the

generally low means and low standard deviations. This is understandable because if schools barely made budgetary provisions for ICT items as seen in Table 7, then they would barely spend on ICT items.

Table 16

Differences in Items on which ICT Budget is spent in Secondary Schools in Lagos and Ogun states

Items on which ICT budget is spent	N	Mean	Standard Deviation	Standard Error of Mean
Purchase of computers	136	0.43	.499	.043
Upgrading existing computers	144	0.52	.503	.042
Purchasing new softwares	96	0.86	.353	.036
Staff training in ICT	63	0.52	.503	.063
Purchasing/Maintenance of Generator	136	0.81	.396	.034

Key

N = Number of administrative staff that responded to the questions

Not spending on purchasing new softwares indicates a lack of adequate software within the school system, and this can limit the most effective usage of the schools' computers. Without adequate training, staff members cannot harness the potentials of the computers. Not spending on purchase or maintenance of generator signals lack of constant power supply to run the computers. Upgrading existing computers is no longer in vogue because personal computers are getting cheaper and so it may be cheaper to purchase a new PC

than to upgrade an existing one. Hence, not spending on upgrading existing computers poses no threat to their effective use.

Question 8.

What can be done to facilitate the use of computers in schools for administrative tasks?

Table 17 contains the answer to research question six. It shows a summary of suggestions by respondents on things that can be done to facilitate the use of computers in schools for administrative tasks.

Table 17

Suggestions by Respondents on how to Facilitate Administrative Use of Computers in Schools

Respondents' suggestions	Frequencies	Rank
Schools should organize training for staff	12	1
Schools should make it mandatory for staff to use computers for all duties	9	2
Staff must be given access to the computers in the school	5	3
Computers must be provided in sufficient quantity	5	3
Schools should computerize all duties	4	5
Every member of staff should be computer literate	4	5
Schools should create awareness about the importance of applying computers to carry out administrative tasks	2	7
Teachers should embark on self development	2	7
Schools should have standby maintenance engineer	1	9
Government should employ trained computer teachers	1	9

A content analysis of 45 school administrators' responses to research question 8 in the CUAQ is summarized in Table 17. The responses were coded and categorized by

commonalities in content. Respondents opined that staff training and making it mandatory for staff to use computers for their duties were strategies that could ensure using computers to carry out administrative duties as indicated by the frequency distributions of 12 and 9 respectively. Giving staff free access to computers and providing computer in sufficient quantity also received some prominence as factors that could promote the use of computers for administrative tasks. In general, knowledge of use of computers dominated the responses.

Hypotheses Testing

Hypothesis 1.

There is no significant difference between public and private schools in the administrative duties for which computers are used.

Table 18 contains the result of independent samples *t*-test conducted on hypothesis one. The table shows that public and private schools did not differ significantly in the administrative duties for which computers were used since each of the calculated value of t is less than the critical value of $t = 1.645$ at the 5% level of significance. Hence, the hypothesis that, public and private schools do not differ significantly in the administrative duties for which they used computers is accepted.

The generally low mean values for both public and private schools indicate that schools in general did not use computers for the selected administrative tasks. In other words, schools rarely used their computers for these administrative tasks. The higher standard deviations ($\sigma > 9.0$) among public schools show that the use of computers for the selected

tasks varied more among public schools than among private schools with lower standard deviations ($\sigma < 1.0$).

Table 18

Differences in Administrative Tasks for which Computers are used in Public and Private Secondary Schools in Lagos and Ogun States

Administrative tasks for which computers are used in the school	**Type of School**	**N**	**Mean**	**Std. Dev**	**Standard Error of Mean**	**Df**	$t_{calculated}$
Admission Register	Public	113	1.30	9.161	.862	155	.636 ns
	Private	44	2.18	.462	.070		
Attendance Register	Public	115	1.55	9.095	.848	157	.660 ns
	Private	44	2.45	.504	.076		
Time Tabling	Public	115	1.32	9.107	.849	157	.735 ns
	Private	44	2.33	.471	.071		
Teachers' weekly diaries and scheme of work	Public	115	1.23	9.106	.849	157	.814 ns
	Private	44	2.35	.424	.064		
Design of school documents	Public	115	1.09	9.124	.851	157	.748 ns
	Private	44	2.12	.291	.044		
Students' personal and academic records	Public	115	1.27	9.120	.850	157	.660 ns
	Private	44	2.18	.451	.068		
Collation of exam. Scores	Public	115	1.18	9.110	.849	157	.815 ns
	Private	44	2.30	.390	.059		
School accounts	Public	115	1.05	9.120	.850	157	.819 ns
	Private	44	2.17	.211	.032		
Inventory of school facilities	Public	115	1.32	9.103	.849	157	.767 ns
	Private	44	2.37	.471	.071		
Personnel records	Public	115	1.32	9.102	.849	157	.774 ns
	Private	44	2.38	.471	.071		

$P < .05$ $t_{critical} = 1.645$ ns = not significant

Key

N = number of respondents (administrative staff)

Table 18 is combined with Tables 19, 20and 21 to offer explanations to hypotheses two, three and four.

The European Commission (2004) proposes using composite indicators to reflect the extent of ICT integration and argues against using pupils per computer ratio as a major indicator because decision makers would be influenced to buy computers in order to raise the value of the indicator without taking sufficient steps to fulfill other needs like training. This researcher believes that some school factors are very fundamental to effective computer integration based on the following reasoning: ICT budget plays a very important role in creating an enabling environment because to acquire more computers and necessary infrastructure so as to reduce the number of users per computer, and consequently increase accessibility requires funds. Similarly, to sustain the positive attitudes exhibited by school administrators through adequate skill development programme and consequently increase the proportion of staff knowledgeable in the use of computers requires funds. The quality of computers will determine the type of software that can be run on the system. Without relevant software for job demands, the computers are useless. Therefore, in this study, ICT budget, quantity and quality of computers and proportion of staff with skills in computer application have been used as composite indicators of effective computer use in schools. These indicators have been found to contribute significantly to the disparities in administrative use of computer in secondary schools in the two States, but with more effect on public than private schools. The foregoing is the basis for hypotheses two to four.

The key statistic in ANOVA is the F-test of difference of group means, testing if the means of the groups formed by values of the independent variable are different enough to have occurred by chance. If the group means do not differ significantly, then it is inferred

that the independent variables did not have an effect on the dependent variable (DeCoster, 2002). By implication, if the group means differ significantly, then it is inferred that the independent variables had an effect on the dependent variable.

Hypothesis 2.

There is no significant relationship between differences in selected school characteristics (ICT budget, quantity and quality of computers, and proportion of staff with computer skills) and disparities in administrative use of computers among all (public and private) secondary schools.

Tables 19 shows the results of the Analysis of Variance (ANOVA) used for testing the differences in selected school characteristics in hypothesis two.

Table 19

Disparities in Administrative Use of Computers among All (Public and Private) Secondary Schools in Lagos and Ogun States Differentiated by Selected School Characteristics

Source of Variation	Mean	SS	DF	MS	F
ICT budget (provision for ICT items)	23.56	9643.5432	1	9643.54320	45.47*
Quantity of Computer	24.34	10054.9626	1	10054.9626	47.41*
Quality of Computer	19.50	8055.4962	1	8055.49620	37.98*
Proportion of Staff with Computer Skills	32.80	13549.6266	1	13549.6266	63.88*
Error		32451.6429	153	212.102200	
Total		73755.3571	157		

* Significant at 0.05 level of significance F(1,153) = 3.84

Table 19 shows that the calculated F values of the main effect for ICT budget (45.47), quantity of computers (47.41), quality of computers (37.98), and proportion of staff with

that the independent variables did not have an effect on the dependent variable (DeCoster, 2002). By implication, if the group means differ significantly, then it is inferred that the independent variables had an effect on the dependent variable.

Hypothesis 2.

There is no significant relationship between differences in selected school characteristics (ICT budget, quantity and quality of computers, and proportion of staff with computer skills) and disparities in administrative use of computers among all (public and private) secondary schools.

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Proportion of Staff with Computer Skills	32.80	13549.6266	1	13549.6266	63.88*
Error		32451.6429	153	212.102200	
Total		73755.3571	157		

* Significant at 0.05 level of significance F(1,153) = 3.84

Table 19 shows that the calculated F values of the main effect for ICT budget (45.47), quantity of computers (47.41), quality of computers (37.98), and proportion of staff with

skill in computer application (63.88) were higher than the critical F-ratio of 3.84 at α = 0.05. This implies that the means of the selected school characteristics differ significantly and so they have an effect on the use of computers for administrative tasks in schools. This suggests that ICT budget, quantity of computers, quality of computers and proportion of staff with skills in computer application contributed significantly to the disparities in administrative use of computers in all (public and private) secondary schools in Lagos and Ogun States.

Hypothesis 3.

There is no significant relationship between differences in selected school characteristics (ICT budget, quantity and quality of computers, and proportion of staff with computer skill) and disparities in administrative use of computers among public secondary schools.

Table 20 shows the results of the Analysis of Variance (ANOVA) used for testing the differences in selected school characteristics in hypothesis three. The table shows that the calculated F values for ICT budget (11.06), quantity of computers (36.86), quality of computers (19.01), and proportion of staff with skills in computer application (22.03) were higher than the critical F-ratio of 3.92 at α = 0.05. This implies that the means of the selected school characteristics differ significantly and so they have an effect on the use of computers for administrative tasks in schools.

Table 20

Disparities in Administrative Use of Computers among Public Secondary Schools in Lagos and Ogun States Differentiated by Selected School Characteristics

Source of Variation	Mean	SS	DF	MS	F
ICT budget (provision for ICT items)	12.43	7726.8	1	7726.800	11.06*
Quantity of Computer	41.43	25752.4	1	25752.40	36.86*
Quality of Computer	21.37	13284.96	1	13284.96	19.01*
Proportion of Staff with Computer Skills	24.76	15391.68	1	15391.68	22.03*
Error		116861.53	110	698.7400	
Total		179017.37	114		

* Significant at the 0.05 level of significance F(1,110) = 3.92

This suggests that ICT budget, quantity of computers, quality of computers and proportion of staff with skills in computer application contributed significantly to the disparities in administrative use of computers in public secondary schools in Lagos and Ogun States.

Hypothesis 4.

There is no significant relationship between differences in selected school characteristics (ICT budget, quantity and quality of computers, and proportion of staff with computer skills) and disparities in administrative use of computers in private the schools.

Table 21 shows the results of the Analysis of Variance (ANOVA) used for testing the differences in selected school characteristics in hypothesis four. The table shows that the calculated F values for ICT budget (7.79), quantity of computers (4.42), quality of computers (4.93), and proportion of staff with skills in computer application (4.79) were higher than the critical F-ratio of 4.08 at $\alpha = 0.05$.

Table 21

Disparities in Administrative Uses of Computers among Private Secondary Schools in Lagos and Ogun States Differentiated by Selected School Characteristics

Source of Variation	Mean	SS	DF	MS	F
ICT budget (provision for ICT items)	35.52	7623.26	1	7623.26	7.79*
Quantity of Computer	20.17	4327.64	1	4327.64	4.42*
Quality of Computer	22.48	4823.9	1	4823.90	4.93*
Proportion of Staff with Computer Skill	21.84	4686.24	1	4686.24	4.79*
Error		38176.45	39	**978.8833**	
Total		59637.45	43		

* Significant at the 0.05 level of significance F(1,39) = 4.08

This implies that the means of the selected school characteristics differ significantly and infers that these school characteristics have an effect on the use of computers for administrative tasks in schools. This suggests that ICT budget, quantity of computers, quality of computers and proportion of staff with skills in computer application contributed significantly to the disparities in administrative use of computers among private secondary schools in Lagos and Ogun States.

Relationship Between Selected School Characteristics and Disparities in Administrative Uses of Computers in Selected Secondary Schools

Table 22 shows the F-ratios of the analyses in Tables 19, 20 and 21. The results on Table 22 is combined with the results on Table 18 to explain observable possible relationships between the selected school characteristics and disparities in administrative use of computers in secondary schools in Lagos and Ogun States.

Table 18 shows that though both public and private schools in general sparingly used their computers for the selected tasks, private schools seemed to make use of their computers for administrative tasks more than public schools. In other words, public

schools seemed to use their computers for administrative duties less than private schools. Judging from the size of the calculated F ratios and their respective critical F ratios displayed in Table 22, it can be concluded that the influence of differences in selected school characteristics on disparities in administrative use of computers were more pronounced in public schools than in private schools.

Table 22

F-ratios of Selected School Characteristics for All (Public and Private combined), Public, and Private Secondary Schools in Lagos and Ogun States

Selected School Characteristics	**All Secondary Schools (Public and Private)** *F_critical = 3.84*	**Public Schools** *F_critical = 3.92*	**Private** *F_critical = 4.08*
ICT budget (provision for ICT items)	45.47*	11.06*	7.79*
Quantity of Computer	47.41*	36.86*	4.42*
Quality of Computer	37.98*	19.01*	4.93*
Proportion of Staff with Computer Skill	63.88*	22.03*	4.79*

* Significant at the 0.05 level of significance

It can, therefore, be inferred that there is significant relationship between differences in selected school characteristics (ICT budget, quantity of computer, quality of computers and proportion of staff with skills in computer application) and disparities in administrative use of computers among public, private, and both public and private secondary schools combined respectively in Lagos and Ogun States. That is, differences in schools characteristics have an effect on differences in the use of computers for administrative tasks in secondary schools.

Limitations of the Analyses and Findings

Analysis of Variance (ANOVA) results only showed that there is a relationship between selected school characteristics and use of computers for administrative duties in schools. The analysis did not show the magnitude of the relationship.

An important assumption that underlies ANOVA is that all treatments have similar variance (homogeneity of variance). If there are strong reasons to doubt this, then data might need to be transformed before the test can be done. However, this study did not test for homogeneity of variance for the selected school characteristics.

Unexplained variance may result in part from error in the measures of the variables. However, given the relatively high reliability coefficients for the variables in the study, it is more likely that the unexplained variance signals that additional variables that were not included in the study also contributed to the disparities in administrative use of computers in the schools.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, IMPLICATIONS, CONCLUSION, AND CONTRIBUTION TO KNOWLEDGE

This chapter presents the summary of the findings of the study, discusses the findings based on the evidences in literature and experiences. Conclusions are drawn from the study findings and contribution to knowledge elicited.

Summary of Findings

Although there have been several attempts to get computers into schools, this study confirms that obstacles to implementation exists as observed by Gahala (2001). For example, computers are not placed in easily accessible locations, just in time technical support are not available, and staff lack knowledge of use. Nevertheless, this survey reveals an important consideration for individual staff who are expected to make use of the computers placed in their respective schools – the consideration that though they identify the usefulness of computers in facilitating their administrative tasks, they need all the necessary support to make effective use of the computers. This support will come in form of provision of extensive computer facilities within the school, which requires a strong financial position for the school, ICT training package for staff to create awareness of new technological development, and strong technical support. This is in consonance with the view of Akbaba-Altun (2006) that the successful integration of technology is not simple because it depends on interlinking variables.

The Canadian schools (elementary and secondary) had challenge in getting sufficient ICT funds, and more than half of the schools were equipped with medium speed processor and yet the teachers could use them for basic administrative tasks but could not engage their students effectively in the use of ICT to enhance their learning because the teachers were not adequately prepared (The Daily, 2004). This situation is similar to what obtains in the sampled schools in Nigeria. The more probable reason, therefore, why the teachers in Nigerian schools, constituting a greater percentage of school staff, could not use computers for their teaching tasks would be due to lack of relevant skill. Thus, undermining the importance of training. It also shows that the level of skill required to integrate computers into the curriculum is higher than that required for integrating it into administrative processes. Therefore, with just a minimal effort into developing the skill of staff in schools, computers would be effectively used for administrative tasks and therefore the potentials of computers in schools would no longer be wasted.

Training has solid theoretical foundation in the three theories hence, one expected that among the four selected variables (ICT budget, quantity of computers, quality of computer, and proportion of staff with computer skills), the proportion of staff with computer skill would predict more administrative use of computers in all the secondary schools (public and private). Interestingly, the proportion of staff with computer skills, having the highest F value of 63.88, contributed more substantially to the variance in the administrative use of computers among all secondary schools (see Table 19), while quantity of computer, with F value 36.86, and ICT funds with F value 7.79 were the variables that contributed more substantially among public and private secondary schools respectively as shown in Tables 20 and 21 respectively. This suggests that there are complex relationships among the school characteristics that influence administrative use of computers.

Discussion of Findings

This section discusses the findings as they relate to the three synthesized theories of diffusion, absorptive capacity, and adaptive structuration respectively and the variables of the study with respect to their roles in the effective use of the computers in schools. This is an empirical study that examines the possible influence of school characteristics on innovative use of computers that have been placed in secondary schools in Nigeria. In view of the fact that the process of placing computers in schools does not consider the influence of school characteristics on their effective use, this study has examined how the school characteristics may likely affect administrative use of computers. Results are interpreted in the light of the extent to which the proposition emerging from the fusion of the relevant aspects of the three theories of adoption, absorptive capacity, and adaptive structuration can explain the variation in school characteristics in relation to administrative use of computers.

The design of the study allows for obtaining descriptive information or explanations on current status regarding the use made of computers in the schools and the effect of school characteristics on the level of administrative use of these computers. Cawthera (2001) argues that in order to bring about effective computer usage in education several factors should be considered. The importance of four selected school characteristics (ICT budget, quantity of computers, quality of computers, and proportion of staff with computer skill) have been highlighted. Administrative use of computers was significantly affected by the four school characteristics. The findings supported (i) the Theory of Adoption/Diffusion of Innovation that emphasizes the process of making an innovation attractive or acceptable to members of a social system, and this happens over a period of time; (ii) the

Adaptive Structuration Theory which asserts that differences in social systems' background (represented by school characteristics in this study) may result in different results of computer integration; and, (iii) the Theory of Absorptive Capacity which hammers on knowledge stock, a phenomenon that takes place over a period of time.

Staff attitude to computers.

The shape of the present and future use of computers in schools depends upon decisions that are made by schools. These decisions will largely be based on their perceptions concerning the importance and value of the computers. The study shows that school administrators show relatively high positive attitudes to the use of computers as indicated in Tables 3 and 4. However, the computers in schools are generally not being used by school administrators in spite of their positive attitude to administrative use of computers. This confirms a previous study finding by Roszell (Krysa, 1998) that teachers who used IT perceived IT applications to be effective, but there were a relatively low number of teachers using IT, but contradicts the findings of empirical studies conducted by scholars (Hinnant, 2002; Poku and Vlosky, 2002; Rogers, 2005; Chapman, Garrett, and Mahlck, 2004; Pelliccione and Giddings, 2004; Stirman, Crits-Christoph and DeRubeis, 2004) that it is those who cannot identify any benefits for themselves that are less likely to attempt to adopt ICT in their own tasks, and those reported by Olalere (2005) which found that computer experience significantly relates to a more positive attitude towards computers, with high level usage correlating strongly with positive attitudes and low level usage correlating strongly with negative attitudes. One reason may be due to the fact that if teachers see the introduction of computers into their teaching activities as bringing curriculum change with it, they may adopt a resistant attitude to this change. Another possibility is that other factors mediate between attitude to the use of computers for administrative tasks and the level of use of these computers. For example, Lumpe and

Chambers (Angers & Machtmes, 2005) identified 14 categories of contextual factors impacting on teachers' beliefs about technology, some of which are: resources, professional development, Internet access, quality software, administrative support, parental support, teacher support, technical support, and planning time. Angers and Machtmes (2005) note that training makes a positive difference to the attitude of those who receive it, which by inference means that lack of training will make a negative difference. The study has an evidence of administrators having been trained at some level, but this appears not to have interacted well enough with administrators' positive attitude for any visible positive influence on computer use. Furthermore, according to Bryom (Angers & Machtmes, 2005), research literature says that leadership is the single most important factor affecting successful integration of technology. Some researchers believe that schools, being the social organization that they are, are directly at odds with new technologies (Zhao & Frank, 2007). What appears to outsiders as a straightforward improvement can, to an organization, be felt as undesirably disruptive if it means that culture must change its values and habits in order to implement it. Thus, the lack of use, in spite of high positive attitude may be due to many other factors.

Staff access to computers.

Access to computers is expected to lead to widespread use as observed by Rusten (2002) and supported by Robertson, Calder, Fung, Jones, O'Shea, and Lambrechts (Mumtaz, 2000) who found that access to personal palmtop computers increased the staff's use of application packages in their work, particularly for administration (e.g., keeping class registers, and assessment scores). Access to an object will create awareness about it and enhance the skill and consequently knowledge of its use. Table 6 shows that private schools staff had access to computers after school hours more than public schools'. It is often assumed that people must have had computer skills because of increasing exposure

to computers in the society. It is possible to be a whiz at word processing, but lose files because of lack of understanding of basic file management. The World Bank (Kalu and Ekwueme, 2003) remarks that lack of awareness about the capabilities of the technology and absence of skills to use ICT applications represent significant obstacles to adoption, even when the physical infrastructure is available. Similarly, Collis, Kirschner and Davis (Olalere, 2005) stress that in order for teachers to implement computer education, they will need to become proficient in basic computer operations, basic applications of software like word processing, databases, spread sheets, and graphic software. This study shows that private schools had used computers longer than public schools, had a lower staff-to-computer ratio than public schools, and their staff had access to computers outside school hours (see Tables 6 and 9). Private school administrators, therefore, had more prospects to develop their skills and upgrade their knowledge of use of computers as shown in Table 10. Hence, based on the findings of this study, the expectation that access leads to widespread use and consequently skill development and knowledge of use is sustained.

Skill development programme on computers for staff.

As schools commit more funds to the purchase of technology, they must also look at the support needed by the end users of the purchases. Support denotes activities that compel school administrators to use computers for their administrative tasks and consequently help users improve the ways they work. The knowledge of the situation in schools regarding the integration of computers into school processes will give direction as to the kinds of support needed by the schools towards effective integration of the computers into their activities, particularly administrative activities. Providing computer training for staff, therefore, is a critical factor in their successful utilization, and it is also part of the processes involved in effective computer provision. The study shows that more schools

into administrative tasks. If staff members were not trained on practical use of the computers, then they would not appropriate it to their administrative tasks (Table 18). Sometimes, knowledge of use is assumed because of increasing exposure to computers in the society, and from experience, this is not so. Most of the sampled schools have been in existence for more than 15 years and apparently majority of staff in these schools have been working for at least 15 years. These crops of staff would not have been introduced into practical uses of computers in their pre-service training programmes.

Provision for ICT funds in schools.

When placing computers into schools either by the government or by some donors, total cost of ownership is often underestimated. Technology expenditures cover expenditures on equipment as well as software, maintenance and support, skill development in the use of computers, and infrastructure upgrade. There is a level of costs that is required to successfully implement educational technology as noted by Abumere (1978), Means and Oslon (1995) and Cawthera (2001). In managing technology integration, there must be adequate budgetary allocation, and a financial plan to replace technology components as they become obsolete. The lack of either of these key ingredients in the budgeting process will ultimately result in a technology system that does not function as an effective tool. This study found that public schools in general (Lagos and Ogun States) did not have budgetary provisions for ICT related items (see Table 7). This shows that in public schools where computer acquisition is essentially government initiated, consideration is only given to initial cost of computers, which, according to Cawthera (2001) is only about 16 – 20% of the overall cost of sustaining the initiative. Support and training are recurrent costs that are larger than the initial costs of hardware purchase.

organized training programmes in basic computer operations such as word processing and spreadsheet. This, according to Lindelow (Ellis, 1984), is a good starting point in computerizing school operations because word processing programs are normally easy to use and therefore dispel "computer phobia". Lindelow suggests that the next step is to explore electronic spreadsheets and other quantitative analysis programs. The implication of this suggestion is that the Microsoft Office package that comes with personal computers offers a good starting point for administrative use of microcomputers.

Ogun State secondary schools had a less proportion of staff knowledgeable in computer use while Lagos State public school administrators had relatively more staff knowledgeable in computer usage. But the higher proportion of staff knowledgeable in computer use in Lagos State did not translate into more use in Lagos State schools than in Ogun State's as indicated by the study findings that schools in general did not use computers for their administrative tasks (see Table 18). This situation may be explained in the light of McKenzie's (1991) observation that teachers trained in one technology and mind-set sometimes find themselves grid locked into old patterns and perceptions. Thrust into a world of new technologies, they persist in seeing them in terms of the familiar; the word processor, for example, is viewed as a glorified typewriter with powerful editing features rather than as the ideal processor it can be. The effect of Lagos State, being a high-tech city, may have rubbed on school administrators in that State so that personally, they acquired knowledge of use to enable them surf the Internet in cyber cafés. In addition, Lagos state government, having placed the computers in the schools, only organized training programme for the teachers, though, for teaching only. A barrier to implementation may be created if skill development focuses on learning about the computer instead of learning about how to use the computers for specific tasks. Knowledge of use may not have included practical strategies for integrating computers

While Ogun State had a higher percentage of public secondary schools with ICT budget than Lagos State public secondary schools, Ogun State secondary schools had far less proportion of staff knowledgeable in computer usage as indicated by a selectivity index less than one (< 1) as indicated by Table 10. These findings could be related in a number of ways. The Ogun state government's intervention in schools that opted for the computer-in-school programme is limited to advisory roles in terms of prescribing computer configuration for the schools. Schools opted to participate in the programme at their own expense. These schools might not be financially buoyant enough, but opted to participate in the programme so as to be in the 'good book' of the government. To train staff on the use of the acquired computers requires funds, and these were not provided for in the schools. The findings of this study thus support the view of Sherry and Gibson (2002), Eniayeju and Eniayeju (2003), and Dede (2004) that for effective and sustained use of computers in any organization (school inclusive), there must be continuous, extensive flow of resources and expertise throughout the system to fuel its sustainability – in terms of professional development, technical support, equipment upgrades, and regular maintenance and these are capital intensive activities. Studies have shown that insufficient funds have hampered the adoption of ICT in schools (Paul, 1999; Plante and Beattie, 2004; Askar et al., 2006). Private schools (Lagos and Ogun States) and Ogun State public schools that made more budgetary allocation for ICT items (see Table 7) barely spent the budget on essential items (see Table 16). One problem with the schools' financial systems is that they are not particularly well tied to identifying and including costs associated with deploying, maintaining, and upgrading technology. The reason for this trend may not be far fetched. One of the facilitators identified by respondents in the study (see Table 14) is principal's interest. Hence, principals who manage best without collaboration will invest more on items that align with their personal biases which may not include technology biases.

Infrastructure.

It is critical that schools have the necessary infrastructure such as electricity supply that allows sustainability, innovativeness and responsive service standards (Lagos State Government, 2004). Nachmias et al. (2004) found that factors related to infrastructure have high levels of involvement in ICT innovation. In line with these findings, Mfum-Mensah (2003) observed that some schools in Ghana successfully implemented ICT projects because they possessed the infrastructure to accommodate ICT equipment donated by benevolent organization. However, this study found that schools are generally poor in relevant infrastructure (see Table 13). This is a clear indication that the sampled schools operated under an environment that did not encourage innovativeness in the use of their computers even if individuals were willing. Thus, contrary to the findings by Sharma et al. (2005) that IT infrastructure is not a major issue for the implementation of IT in schools, infrastructure could be an issue for effective implementation of ICT in schools in Nigeria judging by the non-use status of the computers in the schools.

Length of use of computers.

This study shows that private schools had used computers longer than public schools as indicated by the mean values of 4.81 and 3.10 respectively (see Table 6). The implication of this is that administrative use of computers ought to have diffused better in private schools and this is not the case since though private schools appeared to use computers slightly more than public schools, the difference has been found not to be significant (see Table 18). Contrary to Larsen, Tonge and Roberts (2001) submission that, three years is a reasonable time-span to initiate and implement long-term strategic information system (IS) programmes, and also to Ward and Parr (2003)'s observation that, most ICT strategies follow a 3-5 year cycle, the time interval between acquisition and time of this

study might not have been long enough for proper diffusion with Rogers' (2005) argument that diffusion of an innovation often requires a long period of time from the time it becomes available to the time it becomes widely adopted and used. This presumes that mastering technology requires sufficient time. Teachers, who constitute a greater percentage of school administrators, have very little official time for planning and preparing for the use of any new innovation. A user that spends an average of eight hours a day for one year will master the use of computer better than a user that spends an average of two hours per day for three years. Schools must therefore find creative ways to provide release time for teachers to become effective computer users.

Considering the fact that the sampled schools had acquired computers for more than 5 years as at the time of data collection, Table 6 shows that schools did not use computers for the length of period for which the computers had been acquired as indicated by the mean value of 4.33 (which is less than 5) for all schools. Hence, how long a computer has been acquired does not necessarily connote length of use of the computer. To find out what time could be considered long enough requires being researched.

Quality of computers.

This study found that there were more schools with medium speed computers (see Table 12). One problem with low processor speed computers is that modern computer application programs may not run on them, and if they do, they may be very slow. This is because low processor speed computers come with low-capacity disk storage and memory space whereas modern applications usually require larger disk storage and more memory space. More than half of Canadian elementary and secondary schools were equipped with medium processor computers and the teachers could use them for basic administrative tasks such as preparing report cards, taking attendance or recording

grades. Hence, in the sampled schools, computer quality ought not to have contributed to lack of use of the computers. Cawthera (2001) argues that with appropriate software, 386, 486, and low-end Pentium computers can accomplish the simple word processing, data processing, and Internet access functionality without spending money for the latest and fastest computers. The problem might be due to lack of knowledge of use since Microsoft Office package that comes with personal computers (PCs) are sufficient for the basic administrative duties considered in this study.

Quantity of computers.

Anderson and Ronnkvist (1999) observed that lower density levels of computers make it impossible for users to spend much time engaged with the use of computing tools because, the smaller a ratio, the more computer units are available relative to the number of users. This study shows that there were more functional computers, and consequently higher-density level in Lagos State secondary schools (public and private) than in Ogun State secondary schools, but this has not translated into more use. This may be due to a larger median of staff per computer (6.9) in public schools than private school categories with the highest median of staff per computer (5.1) occurring in the high-brow private schools as seen in Table 9. The computer density of 5.5 for all schools (see Table 9) implies an average of five to six prospective users to a computer. This is on a high side. This affects access to the computers, and consequently their effective use. It can thus be inferred that the number of computers within a school is an indicator of the extent of ICT implementation as argued by Rusten (2000) and noted by Pelgrum and Anderson (Nachmias et al, 2004).

Rationale for acquiring computers.

According to Gahala (2001), the schools' initial task is to develop a clear set of goals and expectations, after which the school can then determine the types of technology that will support efforts to meet those goals. A well-conceived plan will first identify the functions to be automated before identifying software that best automate these functions and hardware that runs the selected software. Sharma et al. (2005) note that schools with target plans for the use of ICT could succeed in implementing the tools to a certain extent while schools without such targets ended up almost without doing anything. Cawthera (2001) argues that when computers are given to (or imposed on) schools without proper consultation, their usage and maintenance are less likely to be thought through. The overall goal of technology policies and plans is the successful integration of computers to support student learning and school management. Field experience shows that schools in Nigeria do not generally have technology plan. As shown in Table 6, schools hardly had any rationale for the computers they acquired. Information about the computer education programme in Lagos State could possibly imply that the computers were imposed on the schools. For Ogun State, if the reasoning that schools opted to participate in the programme was just to be in the 'good book' of the government is true, then it is not far from imposition. However, this does not rule out the fact that some schools genuinely opted to participate because of perceived advantage of computers, yet the schools still had no goals of their own outside the government's programme.

According to the NFES (2002), in content terms, technology plan should address three major areas: vision, access, and integration. Vision pertains to what is expected from the technology overall. Access refers to acquisition, deployment, and making the technology available to the target audiences; while integration is the development and implementation of strategies that make technology useful and capable of accomplishing

the vision. One of the findings shows that the only aspect of technology plan addressed in the computer-in-school programmes of Lagos and Ogun States of Nigeria was the aspect of access – acquisition of computers. There was no evidence that schools and/or donors had any technology plan than that computers must be placed in schools. A plan for technology is crucial because it can help maximize the potential of technological innovations while helping to overcome the challenges of implementation. Ultimately it should result in more efficient expenditures and improved school management. NFES (2002) asserts that technology plans are central to technology deployment and these can be tools of reform and guidance, and as such they can impact every aspect of technology infusion in school. This is because all technology plans should take into account long-range funding issues, focus on administrative enhancements, coordinating all aspects of technology integration, including professional development and staff training. Thus the lack of technology plans, both at the government and school levels is a key inhibitor.

Facilitators and inhibitors of computer use in schools.

The major facilitators of administrative use of computers identified in the study as shown in Table 14 are: extensive computer facilities within the school, strong financial position of the school, ICT training package for staff, awareness of new technological development, strong planning capacity of the school, strong technical support, and principal's interest. The major inhibitors (see Table 15) are: lack of constant electricity, lack of appropriate skill development programme, financial constraint, fear by staff that computers may take over their jobs, and location of computers. The most prevalent facilitating and inhibiting factors that emerge from this study are strikingly similar to those reported in earlier research studies on computer use for teaching and learning (Akbaba-Altun, 2006; Angers et al., 2005; Berge et al., 1999; and Dougiamas, 1998).

Implications of Findings for Policy

The society has experienced continuing changes in technological society have placed new demands on the citizens. Hence, policy makers are charged with the responsibility of carefully considering the processes involved in the provision of computers in schools so as to ensure high levels of usage. With the knowledge that technology has a role to play in making school administrators effective, the study has highlighted factors constituting enabling environment for effective administrative use of computers, which policy makers must consider while devising strategies for implementation of computer-in-school programmes.

Developed countries of Europe and America have made legislative provisions on the imperative use of technology in the instructional process, and the Education Reforms Act of 1988 compelled Britain's central government to make budgetary provision for education technology (Iyamu & Ogiegbaen, 2006). Consequently, there has been a staggering amount of research and publication related to the use of technology for educational purposes in the industrialized nations and a fast pace of ICT experience by Britain in the last 20 years. A similar legislative use and funding of computers in Nigerian schools would compel government and schools to ensure effective integration of acquired computers into school processes and ensure that funds are made available for activities that are necessary to sustain the computers in use.

Based on the higher level of use of computers in the private schools compared to the public schools, it appears that top-down technology-based reform efforts (found in the public schools) are less effective than those that have a strong school base (as it is in private schools). This suggests that the policy which encourages the higher level of

decision process to decide what equipment schools will get or how they are to use it, and which does not encourage the participation of teachers and other staff in the process of thinking through the goals for acquiring the equipment and selecting technologies to match the goals has to change to eliminate wastage of resources. From experience, innovations that are not consistent with the interest of the government in power often die off when those who introduced the changes have left office. There is, therefore, the need for a policy that supports and sustains worthwhile ICT innovations in schools. Moreover, when computers are given to (or imposed on) schools without proper consultation, their usage and maintenance is less likely to be thought through, and generally they are more likely to be treated as a burden. However, processes of provision, which foster ownership of resources, are more likely to facilitate their effective use. When individuals buy-in to technology implementation, they possess ownership of the idea and usually become facilitators in making the innovation successful. This is not to say that the present system of placing computers in schools is completely deficient. Computers supplied to schools by Governments have the same configurations in Lagos and Ogun States respectively. This is a way of setting technical standards to provide a platform for users to share information and use computer hardware and software. The practice of making it voluntary for schools to participate in the computer-in-school programme is a form of participatory system that can be improved upon. Thus the following processes, suggested by Cawthera (2001) are recommended: schools can bid for the provision of computers on a competitive basis. If they succeed, they will feel they have earned it and it belongs to them – giving them a sense of ownership; in making the bid, schools can outline how they will ensure the computers are used effectively, should their bids be successful. This means that schools think these processes through for themselves, and they are then more likely to take the measures needed to ensure effective position such as: how computer usage will be integrated into administrative tasks; how staff will access training in the use

of computers, how running and maintenance costs will be met, and who will manage and maintain the computers. This bidding system fits perfectly into the phased manner in which governments place computers into schools. Within this model, successive rounds of bids can be run with the provision first going to schools most likely to make best use of resources. Schools less likely to make best use of resources can be given additional help in thinking through critical issues and can learn from schools that make successful bids. One advantage of this is that schools where staff have little idea of computers and the way they can be used in education will most likely make effort to update their knowledge of things that will help them prepare effective bids. With the bidding system, the policy of dumping computers in schools will give way to a comprehensive Technology Plan which encourages a bidding process.

Previous studies have focused on the use of computers for teaching-learning process. If learning is the impetus that drives the use of computers in schools, and teachers have low or no skill to put them to effective use, then teachers and students are partners in the learning process – a situation that may not be embraced by teachers. But if administrative use of computers is the impetus, there will be opportunity for teachers, among other staff, to master their use and build enough confidence before integrating them into the curriculum, and thereby have no cause to feel inferior before the students. Administrative tasks constitute the daily processes that allow teaching and learning to take place in schools. Therefore, administrative use of computers should be the primary goal of sending computers into schools.

Implications of Findings for Practice

The study has enlightened school administrators to know that, apart from the original purpose of teaching and learning, computers in their schools can be used for other purposes. Hence, the computers sent to schools for teaching and learning can be used simultaneously for carrying out administrative duties.

Having realized the important role that computers will play in making school administrators effective, schools will ensure that the training of the entire staff in the use of ICT in schools be made an important aspect of provision and so must be budgeted for and training programme provided according to individual staff needs. With the information provided by the study, administrators are aware of the factors that affect the use of computers placed in the schools, and can then work around them to develop strategies for ensuring equitable use of the computers by all staff. For example, allocation of resources for planning and training will shift to individual schools, so that schools will be able to arrange for training and development activities based on identified needs.

Technology funding needs to be sustained in order to provide upgrades, maintenance, and ongoing professional development. Computers are expensive educational resources. As schools assume ownership of the computers, making budgetary allocations for them in schools would be ensured. Recovery measures are encouraged as a way to meet running costs. However, if schools are to provide a service which they charge for and operate as an income generating venture, it is likely that they will need help in planning and executing this.

Whether and how schools assess professional development programmes is an important indication of the seriousness with which staff development is considered. By evaluating professional development, technology planners and administrators can learn what is working and who needs help. Hence, it becomes necessary also for administrators to receive training in evaluating administrative and support staff computer proficiency. To ensure continuous skill development, schools should provide ongoing technology update classes and new user classes for new staff members; encourage the establishment of computer mentor relationships that allow staff members to share technology information in return for innovative ideas.

As noted by Cawthera (2001), two factors affecting optimal usage of computers are hours of use per day, and students per computer. Riffel and Levi (1997) note from literature that originally technology that have been adopted to facilitate existing function and activities, could, with time, permit the organization to do things it was not able to do. Thus, to increase the cost effectiveness of computers in schools, their use can be extended from teaching and learning to performing administrative tasks and vice versa. More of lower capacity computers can be acquired in place of few higher capacity ones in order to reduce the number of staff per computer, thereby creating opportunity for more access.

Implications of Findings for Research

There is the need for further research into the strength of contribution of the presence or lack thereof of each of the school characteristics to effective integration of computers into school activities. The interactive influence of the selected school characteristics need to be investigated since the influence of each of the characteristics varies from school to school. Further study needs to be conducted on staff characteristics as they affect

effective use of computers in schools since members of staff are directly responsible for the extent of use of these computers. Research is needed to determine what time can be said to be long enough for adequate diffusion of innovation. More research is required into the relative prevalence of the facilitating factors of computer integration in schools.

Contributions to Knowledge

The existing literature on the use of computers in secondary schools in Nigeria does not report any study on administrative use of computers. The study adds to literature surrounding technology integration with a perspective about computer technology as an administrative tool.

Rogers (Booth & O'Rourke, 2000) assert that an innovation has two identifiable components: a technology component, which facilitates a change in circumstance, and an idea or theory, which posits a particular outcome. Schnitz & Azbell (2003) opine that without a testable construct of what technology should accomplish, what roles and functions it can fulfill in the context of specific educational goals, it is difficult to imagine how research can identify meaningful cause and effect and specify the conditions under which effects occur. They argue that the current approach to research on ICT in schools needs to be replaced by research into testable propositions that examine a coherent theory of the relationship of ICT to school operations, practices and results. They then suggest that the time is ripe to articulate a coherent theory and spur research to provide data about what works for what purposes, under what conditions, and for which audiences. It is hoped that, this study has fulfilled these expectations within the limits of conditions (school characteristics) focused on. Study findings support the model (Figure 1) that administrative use of computers may be affected by school characteristics.

While literature shows that teachers' beliefs appear to shape their goals for technology, this study adds to literature surrounding technology integration with a perspective on beliefs about computer technology as the study shows that positive attitude does not automatically result in high-level computer usage neither does negative attitude automatically correlate with low level usage as generally reported in literature. The study further reinforces the observation by some scholars that easy access increases or leads to widespread use. However, there is no evidence from the study that acquiring computers for at least five years has any visible impact on the use of computers.

Mairess, Cette, and Kocoglu (2002) observed that diffusion of ICT is often measured with quantitative indicators except the indicator that quantifies the various uses in computer. This study has used an indicator (application areas) to quantify administrative use to assess diffusion of computers in schools. Scholars (Larsen, Tonge & Roberts, 2001; Ward and Parr, 2003) observed that most ICT strategies follow a 3-5 year cycle, and Rogers (2005) claims that adoption often requires a long period of time from the time it becomes available to the time it becomes widely adopted and used. Riffel and Levin (1997) note from literature that technology that have originally been adopted to facilitate existing function and activities, could, with time permit the organization to do things it was not able to do before. However, the schools in this study have acquired computers for at least five years and have hardly used them; thus implying, based on Rogers' (2005) claim, that five years may not be a long enough time for computers to be adopted and used. On the other hand, based on this study's suspicion that no single school characteristic is sufficient of itself to adversely affect effective use of the computers in the schools, the period of more than 5 years for which the computers have been acquired

by the sampled schools is more than sufficient to master the use of computers for effectiveness provided all other school characteristics are well articulated.

Cawthera (2001) observes that there is little information relating to the costs of computers in schools, especially in schools in developing countries, and the European Commission (2004) proposes replacing the use of a single factor indicator with composite indicators to reflect the extent of ICT integration. This study fills a gap in these areas. Moreover, given school administrators the understanding that the computers which were originally sent to their respective schools for teaching and learning purposes could as well be used simultaneously for performing administrative tasks without jeopardizing the original intent.

The study has, therefore, contributed to knowledge in the following perspectives:

1. The Thesis developed Computer-Technology-Driven Administrative Task Accomplishment Model, thus adding to efforts towards the development of a coherent theory of IT integration in school operations.
2. The Thesis provided an Integrated People-Organizational Factor approach for speedy and automatic adoption and dissemination of e-administration in secondary schools.
3. The Thesis also expanded the Diffusion strategy as an effective tool for Computer-in-School Programme using various regulatory framework (the prevailing school factors) for secondary schools in South-West Nigeria.
4. The study has demonstrated Adaptiveness-Effectiveness Factor approach to technology use in schools.

5. The Thesis has provided the framework for policy makers to retool the computer-in-school programmes.

Conclusion

This study has shown that the stronger the ICT culture of a school, in terms of providing enabling environment for effective integration of computers into school activities, the more likely it is to use computers. This implies that the lack of use of existing computers in schools is subject to prevailing school characteristics. However, it appears that the selected schools were not prepared for computers and so could not be bothered about providing the enabling environment required to put their computers into effective use. The mode of sending computers into schools shows that schools were treated as ICT clients who are not expected to impose themselves on the technology, but are much more expected to have technology imposed on them. Consequently, as observed by Cuban (Baskin & Williams, 2006), computer use in schools become patterned rather than inspired, reactive rather than proactive, and reproductive rather than creative.

A range of computers across the schools, all of which run on Microsoft Office platform, are capable of supporting administrative activities such as record keeping (students' attendance, student achievement outcomes, finance, asset management, staff and students' personal data) and information provision (newsletters, daily bulleting, report cards and transcripts). Hence, no school is at a disadvantage as far as using the available computers in the schools for these basic activities are concerned. Private schools have provisions for ICT funds and are making use of computers more than public schools. This is a pointer to the importance of ICT funds. The lack of technology plan reflects, in part, the level of sincerity of national policies on the introduction of computers into education.

References

Abumere, S.I. (1978). Situational effects and the diffusion of entrepreneurial innovations in Bendel State of Nigeria. *The Nigerian Geographical Journal,* 21 (2), 44 - 56.

Aghenta, J.A. (1992). Some major educational planning issues, problems and strategies in Nigeria. In T. Ajayi and R.A. Alani (Eds.), *Contemporary issues in Nigerian education* (pp. 17 – 36). Ijebu-Ode: Triumph Books Publishers.

Ajayi, I.A. & Ayodele, J.B. (2005). *Introduction to educational planning, administration and supervision.* Lagos: YPPS Publishers.

Akale, M.A.G. (Ed.) (2003). *Information and communications technology (ICT) and science, technology, and mathematics (STM) education* (Proceedings of the 44th Annual Conference of Science and Technology Association of Nigeria). Ibadan: Heinemann Educational Books.

Akbaba-Altun, S. (2006). Complexity of integrating computer technologies into education in Turkey. *Educational Technology & Society*, 9 (1), 176 – 187.

Alani, R.A. (1987). Population and educational planning: The Nigerian case. *Journal of Behavioural Research,* 1 (2), 31 - 38.

Alani, R.A. (1992). Management crisis in Nigerian education. In T. Ajayi and R.A. Alani (Eds.), *Contemporary issues in Nigerian education* (pp. 83 – 88). Ijebu-Ode: Triumph Books Publishers.

Alani, R.A. (2000a). Towards a system of continuous teacher education in Nigeria. In A. Ejiogu and R.A. Alani (Eds.), *Emergent issues in Nigerian education,* 3, (pp. 204 – 218). Lagos: Mukugamu (Nig.) Company.

Alani, R.A. (2000b). Population and related data for educational planning and administration. In B. Olowoye and R.A. Alani (Eds.), *Administration, supervision and planning for education managers* (pp. 35 – 45). Lagos: Krown Prince Publications.

Anaekwe, M.C. (2003). Identification of some information and communications technology (ICT) enhancing skills of pupils needed for sustainable science, technology, and mathematics (STM) education. In M.A.G. Akale (Ed.), *Information and communications technology (ICT) and science, technology, and mathematics (STM) education: Proceedings of the 44th Annual Conference of Science and Technology Association of Nigeria* (pp. 18-21). Ibadan: Heinemann Educational Books.

Anderson, R.R. & Ronnkvist, A. (1999). The presence of computers in American schools. *Teaching, Learning, and Computing: 1998 National Survey* (Report no.2). http://www.crito.uci.edu/TLC/findings/Internet-Use/Startpage.htm. Accessed on August 28, 2007.

Angers, J. & Machtmes, K. (2005). An ethnographic case study of beliefs, context factors and practices of teachers integrating technology. *The Qualitative Report*, 10 (4), 771 – 794. http://www.nova.edu/ssss/QR/QR10-4/angers.pdf. Accessed on June 18, 2008.

Anumnu, S.I. (2006). *Determinants of employee job attitude and behaviour in some Federal Universities.* Unpublished doctoral thesis, University of Lagos, Nigeria.

Ariyo, A. (2002). Management of information system for dynamic growth. *NIREM NEWS,* 1 (1), 21-35.

Askar, P., Usluel, Y.K., & Mumcu, F.K. (2006). Logistic Regression Modelling for predicting Task-Related ICT use in teaching. *Educational Technology and Society,* 9 (2), 141-151.

Aston, M. (2002, November 21). ICTs in education: Policy and practice. *A paper presented at the UK-Nigeria E-Learning Forum on 'Appropriate ICTs for Developing Countries'.* Federal Ministry of Education and the British Council: Abuja, Nigeria.

Baskin, C. & Williams, M. (2006). ICT integration in schools: Where are we now and what comes next. *Australian Journal of Educational Technology,* 22 (4), 455 – 473. http://www.ascilite.org.au/ajet/ajet22.html Accessed on May 18, 2008.

Berge, Z. & Mrozowski, S.E. (1999). Barriers to online teaching in elementary, secondary, and teacher education. Accessed on June 18, 2008.

http://www.emoderators.com/Templates/moderators.dwt.

Blair, A.D. (2002, June 25). Inspection of standards and quality in Stenhouse Primary School and Nursery Class, City of Edinburg. *A report by HM Inspectorate of Edinburg.*

Bliss Joan, Chandra, P. & Cox Margaret (1986). The introduction of computers into a school. *Computers & Education,* 10 (1), 49 – 54.

Bocquet, R. & Brossard, O. (2003). Determinants of IT adoption, organizational change and the nature of the firm: An empirical study of French survey data. http://eaepe.infonomics.nl/papers/bocquet_brossard.pdf. Accessed on November 10, 2004.

Booth, A. & O'Rourke, A. (2000). Getting research into practice: An optional self-study module for the Unit GMH 6050 – Literature Review and Critical Appraisal. Retrieved on June 8, 2008 from http://www.shef.ac.uk/scharr/ir/units/resprac/diffusion.htm.

Borisade, A.B. (2002, November 21). *An Address delivered at the UK-Nigeria E-Learning Forum on 'Appropriate ICTs for Developing Countries'.* Abuja: Federal Ministry of Education and the British Council.

Brown, R.D. (2001). An investigation of factors influencing the use of computer technology by middle school principals. http://digitalcommons.uncfsu.edu/dissertations/AAI3027004. Accessed on April 14, 2007.

Carron, G. & Chau, T.N. (1981). *Reduction of regional disparities: The role of educational planning.* Paris: IIEP.

Cawthera, A. (2001). *Computers in secondary schools in developing countries: Costs and other issues.* http://www.world-links.org. Accessed on April 24, 2008.

Chapman, D.W.; Garrett, A.; & Mahlck, L.O. (2004). The role of technology in school improvement. In D.W. Chapman & Lars O. Mahlck (Eds.), *Adapting technology for School improvement: A global perspective*. Paris: UNESCO Publishing.

Cheng, Y.C. (1996). Multiplicity of school functions in the new century: The shift of paradigm in school effectiveness research. *Paper presented at the Conference jointly organized by Educational Research Association Singapore and Australian Association for Research in Education, 25 – 29 November 1996.* http://www.aare.edu.au/96pap/cheny96.522. Accessed on October 2nd 2003.

Cheung, W.M. (1999). *A study of multi-level self management in school.* Unpublished doctoral thesis. http://www.uky.edu/~selfmgt/cmc/index.htm. Accessed on January 14, 2004.

Chin, N.W., Gopal, A., & Salisbury, W.D. (1997). Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. *Information Systems Research,* 8(4), 342 – 367.

Claudio de Moura, C. (2004). Are new technologies better technologies? For whom? In D.W. Chapman & Lars O. Mahlck (Eds.), *Adapting technology for School improvement: A global perspective* (pp.). Paris: UNESCO Publishing.

Cohen, W. & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly,* 35 (1), 128 – 152.

Cox, M., Preston, C., & Cox, K. (1999). What factors support or prevent teachers from using ICT in their classrooms? *Paper presented at the British Educational Research Association Annual Conference,* University of Sussex at Brighton.

Deborah, k; Bob, A. & Renee, D (2003). *Computer mediated communication: Adaptive Structuration Theory.* http://www.uky.edu/~rhumano/cmc/index.htm. Accessed on January 15, 2008.

DeCoster, J. (2002). Using ANOVA to examine data from groups and dyads. http://www.stat-help.com/notes.html. Accessed on July 18, 2005.

Dede, C. (2004). *The role of emerging technologies for knowledge mobilization, dissemination, and use in education.* http:www.virtual.gmu.edu Accessed on September 6, 2004.

Dougiamas, M. (1998). Factors affecting educational reform in W.A. Schools. *An essay on recent trends and opportunities in "educational computing.* http://findarticles.com/p/articles/mi-pric/is_198900/ai_502898. Accessed June 18, 2006.

Dow, R. (1973). Computers and management today and tomorrow: A 1970's reassessment. *Ashridge Management College.* http://www.cfsl.mb.ca/cfsl/best_p/index.html, Accessed on November 7, 2007.

Ekireghwo, P.O. (2002, November 21). The National Commission for Colleges of Education and ICT needs in teaching training. *A paper presented at the UK-Nigeria E-Learning Forum on 'Appropriate ICTs for Developing Countries'.* Abuja: Federal Ministry of Education and the British Council.

Ellis, T.I. (1984). Microcomputers in the school office. ERIC Clearinghouse on Educational Management: ERIC Digest, Number Eight. ERIC Educational Reports. http://findarticles.com/p/articles/mi-pric/is_198400/ai_502892674. Accessed August 20, 2008.

Eniayeju, P.A. & Eniayeju, A.A. (2003). Applications of information and communications technologies: Implications for primary schools. In M.A.G. Akale (Ed.), *Information and communications technology (ICT) and science, technology, and mathematics (STM) education: Proceedings of the 44th Annual Conference of Science and Technology Association of Nigeria* (pp. 65-69). Ibadan: Heinemann Educational Books.

European Commission (2004). Implementation of 'Education & Training 2010' work programme: ICT in education and training. *Working Group C – Report on Indicators.* http://www.infoindic[1].pdf. Accessed on May 25, 2008.

Ezeliora, B. (2003). Problems affecting effective use of information technology in the teaching and learning of chemistry in schools in Nigeria. In M.A.G. Akale (Ed.), *Information and communications technology (ICT) and science, technology, and mathematics (STM) education: Proceedings of the 44th Annual Conference of Science and Technology Association of Nigeria* (pp. 139-141). Ibadan: Heinemann Educational Books.

Fasoldt, A. (1990). A brief history of computer speed. *The Syracuse Newspapers.* http://aroundcny.com/Technofile/index.cfm. Accessed on June 18, 2003.

Federal Republic of Nigeria (2004). *The National Policy on Education.* Abuja: NERDC Publishing.

Frambach, R.T. & Schillewaert, N. (1999). Organizational innovation adoption: A multi-level framework of determinants and opportunities for future research. http://www.ebusiness/xerox.com/isbm/dscgi/adnm.py/Get/File=98/29-1999.pdf. Accessed on November, 10, 2004.

Gahala, J. (2001). Critical issue: Promoting technology use in schools. *North Central Regional Education Laboratory (NCREL). Learning Point Associates.* http://www.ncrel.org/sdrs/issues/technlgy/te200.htm. Accessed on November 8, 2007.

Goos, M. & Bennison, A. (2006). *Technology use in secondary mathematics classrooms: A survey of Queensland teachers.* www.aare.edu.au/04pap/goo04313.pdf. Accessed on June 4, 2008.

Grant, J. M. (1995). *Changing teachers' attitudes toward computers through education: A study of the process of change.* Unpublished doctoral dissertation. University of Illinois; Chicago.

Griffin, B. (2000). *A first look at Communication Theory,* (4th edition). Massachussets: McGraw-Hill.

Griffith, T.L. (1999). Technology features as triggers for sensemaking. *The Academy of Management Review,* 24 (3), 472 – 488. http://www.utm.edu/jmikem/griffith99.htm. Accessed on July 30, 2004.

Hess, F.M. (2004). Technical difficulties: Information technology could help schools do more with less; if only educators know how to use it. *Education Next.* http://www.thefreelibrary.com Accessed on February 8, 2008.

Hinnant, C.C. (2002). Information technology and organizational control: Examining the management of IT in an era of e-Government. *Paper for presentation at the American Political Science Association Conference,* Boston, Mass, August 29 – September 1. Draft. http://apsaproceedings.cup.org/State/Papers/024/024007/HinnantCha.pdf. Accessed on November 11, 2004.

Ilori, O. (1995). Computerization of data in Federal Unity schools. In E.T. Ehiametalor (Ed.), *Data Management in Schools, and Other Issues.* Ijebu-Ode: Triumph Publishers.

Iyamu, E.O.S & Ogiegbaen, S.E.A. (2006). Assessment of the use of educational technology by social studies teachers in secondary schools in Western Nigeria. http://www.uky.edu/~iyamuogiegbaen/cmc/index.htm. Accessed on August 8, 2008.

Josiah, M.M.; Pam, B.D.; & Okooboh, M.A. (2003). The status of computer education and science learning in Plateau State secondary schools: A case study of Plateau State central senatorial district. In M.A.G. Akale (Ed.), *Information and communications technology (ICT) and science, technology, and mathematics (STM) education: Proceedings of the 44th Annual Conference of STAN* (pp. 25-28). Ibadan: Heinemann Educational Books.

Kalu, I. & Ekwueme, C.O. (2003). Assessment of teachers' level of literacy and attitude towards information and communication technology (ICT) application in science, technology and mathematics education. In M.A.G. Akale (Ed.), *Information and communications technology (ICT) and science, technology, and mathematics (STM) education: Proceedings of the 44th Annual Conference of Science and Technology Association of Nigeria* (pp. 14-17). Ibadan: Heinemann Educational Books.

Kanugo and Chouthoy (1998). IT planning in India: Implications for IT effectiveness. *Information Technology for Development,* 8, 71 – 87.

Kenaroğlu, B. (2004). Implications of information technology in developing countries and its impact on organizational change. http://www.stps.metu.edu.tr/files/wp/WP_Kenaroğlu.pdf. Accessed on November 10, 2004.

Kim, H. J. & Bretschneider, S. (2004). Local government information technology capacity: An exploratory theory. *Proceedings of the 37th Hawaii International Conference on System Sciences.* http://csdl.computer.org/comp/proceedings/hicss/2004/2056/05/205650121b.pdf. Accessed on November 10, 2004.

Kock, N. (1999). Can adoption of a learner medium increase group outcome quality? *Journal of Information Technology Impact,* 1 (1), 13 – 19. http://www.jiti.com/v1n1/index.html, Accessed on August 9, 2004.

Krysa, R. (1998). Factors affecting the adoption and use of computer technology in schools. http://www.usask.ca/education/coursework/802papers/krysa/ron.htm. Accessed on August 7, 2007.

Kumar, S. & Seth, A. (2001). Knowledge, absorptive capacity, and the theory of the diversified firm. *Academy of Management. Proceedings.* http://www.scl.management.org/manage/proceedings/acadmng/2001/manage.pdf. Accessed on July 2, 2004.

Lagos State Government (2004). Proposed Information Communications Technology Policy. Lagos: Ministry of Science and Technology.

Larsen, P., Tonge, R. & Roberts, M. (2001). Exploring IS planning in High-Growth Medium-Sized enterprises. *Journal of General Management,* 26 (3), 76 – 89.

Lenox, M. & King, A. (2004). Propects for developing absorptive capacity through internal information provision. *Strategic Management Journal,* 25 (4), 331 – 345. http://www3.interscience.wiley.com/cgi-bin/abstract/107, Accessed September 19, 2004.

Long, G.L. (1994). *The development and testing of an instrument to measure mathematics teachers' attitudes toward their use of computers in mathematics instruction.* Unpublished doctoral dissertation. The University of Tennesse, Knoxville.

Lundall, P. & Powell, C. (2000). *Computers in schools: A national survey of information communication technology in South African schools.* Education Policy Unit, University of Western Cape.

Machin, S., McNally, S. & Silva, O. (2007). *New technology in schools: Is there a payoff?* http://www.iexeu.org/index.php. Accessed May 22, 2008.

Mairesse, J., Cette, G., & Kocoglu, Y. (2002). Information and communication technology and economic growth in France. *Handout.*

Mandviwalla, M. (1994). The world view of collaborative tools. *The Arachnet Electronic Journal on Virtual Culture,* 2 (2). mandviwa@astro.ocip.temple.edu. August 9, 2004.

Markus, M.L. (2001, August 9). Mastering information management: How workers react to new technology. *This Day,* 7 (2300), 25.

McKenzie, J. (1991) (Ed.). Designing staff development for the information age. *The Education Journal,* 4 (1). http://fromnowon.org/index.html. Accessed July 28, 2008.

Means, B. & Oslon, K. (Eds.) (1995). *Technology and Education reform: Technical Research Report*, August, Volume 1. http://www.ed.gov/pubs/SER/Technology/. Accessed on June 11, 2008.

Mfum-Mensah,O. (2003). Computers in Ghanaian secondary schools: Where does equality come in? *Current Issues in Comparative Education,* 6 (1), 40 – 48.

Miron, E., Erez, M. & Naveh, E. (2004). Do personal characteristics and cultural values that promote innovation, quality, and efficiency compete or complement each other? *Journal of Organizational Behaviour,* 25, 175 – 199.

Montealegre, R. (1999). A case for more case study research in the implementation of IT in less-developed countries. *Information Technology for Development,* 8, 199 – 207.

Mooney, J.G. (1996). The productivity and business value impacts of information technology: Economic and organizational analyses. *Information Technology for Development ,6,* 161 – 167.

Markus, M.L. (2001, August 9). Mastering information management: How workers react to new technology. *This Day,* 7 (2300), 25.

McKenzie, J. (1991) (Ed.). Designing staff development for the information age. *The Education Journal,* 4 (1). http://fromnowon.org/index.html. Accessed July 28, 2008.

Means, B. & Oslon, K. (Eds.) (1995). *Technology and Education reform: Technical Research Report*, August, Volume 1. http://www.ed.gov/pubs/SER/Technology/. Accessed on June 11, 2008.

Mfum-Mensah,O. (2003). Computers in Ghanaian secondary schools: Where does equality come in? *Current Issues in Comparative Education,* 6 (1); 40 – 48.

Miron, E., Erez, M. & Naveh, E. (2004). Do personal characteristics and cultural values that promote innovation, quality, and efficiency compete or complement each other? *Journal of Organizational Behaviour,* 25, 175 – 199.

Montealegre, R. (1999). A case for more case study research in the implementation of IT in less-developed countries. *Information Technology for Development,* 8, 199 – 207.

Mooney, J.G. (1996). The productivity and business value impacts of information technology: Economic and organizational analyses. *Information Technology for Development ,6,* 161 -- 167.

Morton, D. (2003). Factors affecting the integration of computers in Western Sydney secondary schools. In J.G. Hedberg, J. Steele and S. McNamara (Eds.), *Learning Technologies: Prospects and Pathways,* 107-114. http://www.aset.org.au/confs/edtech96/morton.html. Accessed November 8, 2007.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: A review of literature. *Journal of Information Technology for Teacher Education*, 9 (3). , 319 - 342.

Nachmias, R., Mioduser, D., Cohen, A., Tubin, D. and Forkosh, B. (2004). Factors involved in the implementation of pedagogical innovations using technology. *Education and Information Technologies*, 9 (3), 291-308.

National Forum on Education Statistics (NFES) (2002). *Technology in schools: Suggestions, tools, and guidelines for assessing technology in elementary and secondary education.* http://www.ed.gov/pubs/SER/ch2.html. Accessed on June 16, 2008.

Ndefo, J (2005). *Staff quality and stability, school resources and students progression in Federal Government Schools in South Western Nigeria*. Unpublished doctoral thesis, University of Lagos, Nigeria.

Nwokwule, I.N.S. (1955). Keeping guidance records in secondary schools: Principles, issues and prospects. In E.T. Ehiametalor (Ed.), *Data Management in Schools and Other Issues* (pp. 97-106).

Orlikowski, W. J. (1992). Learning from Notes: Organizational issues in groupware implementation. *MIT Sloan School Working Paper #3428-92. http://www.ccs.mit.edu/papers/CCSWP134.html. Accessed on November 11, 2004.*

Ozoji, B.E. (2003). The place of information and communications technology (ICT) in the teaching and learning of integrated science. In M.A.G. Akale (Ed.), *Information and communications technology (ICT) and science, technology, and mathematics (STM) education: Proceedings of the 44th Annual Conference of Science and Technology Association of Nigeria* (pp. 159-162). Ibadan: Heinemann Educational Books.

Paul, J. R. M. (1999). Empowering teachers to use computers effectively across the curriculum. *Millenium Minds Conference,* September 29 – October 1, 1999. Cape Town. South Africa.

Peled, A. (2000). First-class technology third-rate bureaucracy: The case of Israel. *Information Technology for Development,* 9, 45 – 50.

Pelgrum, W.J. & Law, N. (2003). ICT in education around the world: Trends, problems and prospects. *Fundamentals of Educational Planning (No. 77).* Paris: UNESCO/IIEP.

in lower secondary schools in Bulgaria, the Czech Republic, Hungary, Lithuania, and the Russian Federation. *Educational Technology, Research and Development*, 48 (3), 111 – 120.

Pellicione, L. & Giddings, G. (2004) Information and communication technologies: Institutional strategies revealed through a longitudinal case study. *http://www.aare.edu.au/02pap/02250.htm*, Accessed on September 6, 2004.

Peretomode, V. F. (1992). *Educational administration: Applied concepts and theoretical perspectives.* Lagos: Joja Educational Research and Publishers Limited.

Plante, J. & Beattie, D. (2004). Connectivity and ICT integration in Canadian elementary and secondary schools: First results from the Information and Communications Technologies in Schools Survey, 2003-2004. *http://www.aare.edu.au/02pap/MIEMIE2004017.htm.* Accessed on September 6, 2004.

Poku, K. & Vlosky, R. P. (2002a). A model of impact of corporate culture on information technology adoption. *http://www.rnr.lsu.edu/lfpdc/publication/papers/ITAdoption.pdf. Accessed on November 11, 2004.*

Poku, K. & Vlosky, R. P. (2002b). A model of marketing oriented corporate culture influences on information technology adoption. *http://www.rnr.lsu.edu/lfpdc/publication/papers/wp62.pdf. Accessed on November 11, 2004.*

Riffel, J.A. & Levin, B. (1997). Schools coping with the impact of information technology. *Educational Management and Administration,* 51 (1), 51 -64.

Rogers, E.M. (2005). *Diffusion of Innovation.* (5th ed.). New York: Free Press.

Rogers, E. M. & Scott, K.L. (1999). The diffusion of innovation model and outreach from the National Network of Libraries of Medicine to native American communities. http://nnlm.gov/prn/eval/rogers.html. Accessed on October 13, 2004.

Rudd, P. (2001). School improvement through ICT: The case of England. *Paper presented at the CIDREE Seminar: The use of ICT in supporting effective learning and teaching.* Scottish Education and Teaching Technology Show, SECC, Glasgow.

Runge, J. B. & Lee, J. (2001). Information technology adoption among small retailers. *http://www.usabe.org/knowledge/proceedings/2001/072.pdf. Accessed on November 11, 2004.*

Rusten, E. (2002). Configuration of school technology strategies and options. *TechKnowLogia Knowledge Enterprise, Inc.* http://fcit.coedu.usf.edu/network/ Accessed on November 9, 2007.

Schnitz, J.E. & Azbell, J.W. (2003). IBM learning alignment: Continuous improvement through strategic uses of technology. *IBM Global Education White Paper.*

SchoolNet Nigeria (2003). SchoolNet Diginet project. *Project Document Pilot Phase, November Document, November 2002 – August 2003.*

Schulz-Zander, R. (2004). The school online initiative in German schools: Empirical results and recommendations to improve school development. In D.W. Chapman & Lars O. Mahlck (Eds.), *Adapting technology for school improvement: A global perspective* (pp. 88 -95). Paris: UNESCO.

Sharma, R., Mohanty, L., & Mishra, S. (2005). Identifying the facilitating and inhibitory factors effecting the use of various software tools in schools. *Report of the Seed Money Project.* Submitted to Research & Publication, IIM, Ahmeddabad. http://www.sandeepmishra.net/documents/entrepreneurs/identifying%20the%20Facilitating.pdf. Accessed on August 2, 2008.

Sherry, L. (2004). *Sustainability of innovations.* *http://www.rmcdenver.com/starcenter/sustain.htm,*

Sherry, L. & Gibson, D. (2002). The path to teacher leadership in educational technology. *Contemporary Issues in Technology and Teacher Education [Online Serial], 2 (2). http://www.citejournal.org/vol2/iss2/general/article2.cfm, 2004.* Accessed on September 6, 2004.

Sikkel, K, Ruel, H., & Wieringa, R. (1999). Towards a method for evolutionary implementation of groupware. *http://www.REFSQ.99_paper.htm. Accessed on August 9, 2004.*

Sokan, O. (2003). Report of the first regional conference on Secondary Education in Africa (SEIA) Kampala, Uganda, June 9th – 13th 2003.

Stevens, J. M. (1995). *The impact of computers on attitudes toward learning in Sixth Grade Science Students.* Unpublished doctoral dissertation. University of Nebraska, Lincoln, Nebraska.

Steward, J. (2002, November 21). Viable initiatives in ICT in Nigeria. *A paper presented at the UK-Nigeria E-Learning Forum on 'Appropriate ICTs for Developing Countries'.* Abuja: Federal Ministry of Education and the British Council.

Stirman, S.W., Crits-Christoph, P., & DeRubeis, R.J. (In Press). Achieving successful dissemination of empirically supported psychotherapies: A systhesis of dissemination theory. *Clinical Psychology: Science and Practice.*

Streiner, D.L. (2003). Starting at the beginning: An introduction to coefficient alpha and internal consistency. *Journal of Personality Assessment,* 80 (1), 99-103.

Surry, D.W. & Farquhar, J.D. (1997). Diffusion theory and instructional technology. *Journal of Instructional Science and Technology,* 2 (1). University of Southern Queensland. *http://www.usq.edu.au/electpub/e-jist/docs/old/vol2no1/article2.htm. Accessed on September 6, 2004.*

Suurla, R., Markkula, M., & Nupponen, M. (1998). Effective dissemination: A guide on the dissemination of the results of International Education Projects. *Finnish Leonardo Center. www.leonardodavinci.fi/dissemination/effe-short.pdf.* Accessed on August 17, 2004.

Tettey, W.J. (2000). Computerization, institutional maturation, and a qualitative change: Analysis of a Ghanaian public corporation. *Information Technology for Development,* 9 (2), 16 -21.

The Daily (2004). Information and Communications Technologies in Schools Survey. Canadian elementary and secondary schools survey, 2003/04 school year. http://www.statcan.ca/Daily/English/040610/td040610.htm. Accessed on April 6, 2007.

The World Bank (2002). Secondary education in Africa: Strategies for renewal. *World Bank presentations at the December 2001 UNESCO/BREDA – World Bank Regional Workshop in Mauritius on the Renewal of African Secondary Education.*

Thong, Y.J.L. & Yap, C.S. (2004). Effects of resource constraints on information technology implementation in small businesses. http://www.isi.salford.ac.uk/ifip/faci_a.html. Accessed on August 17, 2004.

Todorova, G. & Durisin, B (2003). The concept and conceptualization of absorptive capacity: Recognizing the value.

Accessed on July 30, 2004.

Tolman, E. (2002). Computer speed. *Computer Science Archive.*

. Accessed on June 18, 2003.

UNESCO (1991). A European platform to develop a mechanism for co-operation in the field of information technologies in education (Cat. VIII) *Final Report and Proceeding.*

UNESCO (2000). *World Education Forum: The Dakar Framework of action.* Paris: Author.

Urias-Barker, Z. (2000). Public school educators' use of computer-mediated communication. *Unpublished doctoral dissertation,* University of North Texas.

van der Zee, J.T.M. (1996). In search of the value of information technology. *Dissertation Abstracts International,* 58 (1). Katholieke Universiteit Brabant (The Netherlands).

Vinding, A.L. (2000). Absorptive capacity and innovative performance: A human capital approach. *http://www.business.auc.dk/\alv/. First Draft, December. Accessed on September 6, 2004.*

Wade, M (2005). Theories used in IS research: Absorptive capacity.

Accessed on March 8, 2008.

Ward, L. & Parr, J. (2003). Computers in schools: A background paper to inform the Samoan Ministry of Education in decision making with regard to the use of computers in schools, with a focus on secondary schools. *SSECRP Phase 2 Project. School of Education*. The University of Auckland.

Yates, B.L. (2001). *Applying Diffusion Theory: Adoption of Media Literacy Programme in schools.* Paper presented to the Instructional and Developmental Communication Division, International Communication Association Conference. Accessed on July 30, 2004.

Zhao, Y. and Frank, K.A. (2007). Factors affecting technology uses in schools: An ecological perspective.

Accessed November 7, 2007.

APPENDIX A

UNIVERSITY OF LAGOS
DEPARTMENT OF EDUCATIONAL ADMINISTRATION

ATTITUDE SCALE

Thank you for completing this schedule. The purpose of this survey is to collect data regarding the use of computers in general administration of schools. Your participation is an important part of this effort. Please answer all the questions as fully as possible.

This is not a test and there are no correct or incorrect answers. **Your responses will be kept strictly confidential.**

QUESTIONNAIRE FOR ALL STAFF

BACKGROUND INFORMATION ABOUT THE SCHOOL:

		RESPONSE			
1	**STATE**				
2	**NAME OF SCHOOL**				
3	**LOCATION**	RURAL URBAN **Pls, Tick One only**			
4	**TYPE OF SCHOOL**	PUBLIC PRIVATE **Pls, Tick One only**			
5	**YEAR ESTABLISHED**				
6	**SCHOOL SIZE**	**TOTAL STAFF**		**TOTAL STUDENTS**	
		Male	**Female**	**Male**	**Female**
7	**OWNERSHIP**	***Pls, Tick One only*** 1. FED. GOVERNMENT 2. STATE GOVERNMENT: 3. VOLUNTARY AGENCY: 4. COMMUNITY: 5. SOLE PROPRIETOR: 6. GROUP:			
8	**RESPONDENT'S STATUS IN SCHOOL**	***Pls, Tick One only*** 1. PRINCIPAL 2. VICE PPRINCIPAL 3. HEAD OF DEPARTMENT 4. HOUSEMASTER 5. YEAR TUTOR 6. BURSAR 7. SECRETARY **OTHERS** (specify)			
9	**RESPONDENT'S HIGHEST QUALIFICATION**				
10	**RESPONDENT'S SEX**	MALE FEMALE **Pls, Tick One only**			

Q/N	QUESTIONS (Circle code(s) as appropriate where relevant)	RESPONSE	CODE
11	I think using a computer would be very hard for me	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
12	The challenge of solving problems with computers does not appeal to me	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
13	Knowing how to use computers is a worthwhile and necessary skill	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
14	I think working with computers would be enjoyable and stimulating	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
15	Working with a computer makes me very nervous	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
16	Using computers for school administration would be good because I would have more time for individual contact with staff and students	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
17	Frequent use of computers would allow easy interaction among members of staff	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
18	Computer-assisted administration would help keep me on task	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
19	I think I could be a more effective administrator if I didn't rely on computers very much	Strongly agree Agree Disagree Strongly disagree	01 02 03 04

Q/N	QUESTIONS (Circle code(s) as appropriate where relevant)	RESPONSE	CODI
20	Using computers would be bad because they would intimidate me	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
21	Using computers would be bad because they stifle creativity	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
22	Computers make me feel uneasy and confused	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
23	I have a lot of self-confidence when it comes to working with computers	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
24	Having members of staff use computers to interact with one another would be a waste of time	Strongly agree Agree Disagree Strongly disagree	01 02 03 04
25	Learning about computers is a necessary subject for all prospective school administrators	Strongly agree Agree Disagree Strongly disagree	01 02 03 04

APPENDIX B

UNIVERSITY OF LAGOS
DEPARTMENT OF EDUCATIONAL ADMINISTRATION

COMPUTER INVENTORY QUESTIONNAIRE

Thank you for completing this schedule. The purpose of this survey is to collect data regarding the use of computers in general administration of schools. Your participation is an important part of this effort. Please answer all the questions as fully as possible.

This is not a test and there are no correct or incorrect answers. **Your responses will be kept strictly confidential.**

QUESTIONNAIRE FOR THE PRINCIPAL/COMPUTER MANAGER

BACKGROUND INFORMATION ABOUT THE SCHOOL:

		RESPONSE			
1	**STATE**				
2	**NAME OF SCHOOL**				
3	**LOCATION**	RURAL **only**	URBAN **Pls, Tick One**		
4	**TYPE OF SCHOOL**	PUBLIC **only**	PRIVATE **Pls, Tick One**		
5	**YEAR ESTABLISHED**				
6	**SCHOOL SIZE**	**TOTAL STAFF**		**TOTAL STUDENTS**	
		Male	**Female**	**Male**	**Female**
7	**OWNERSHIP**	***Pls, Tick One only***			
		1. FED. GOVERNMENT	2. STATE GOVERNMENT:		
		3. VOLUNTARY AGENCY:	4. COMMUNITY:		
		5. SOLE PROPRIETOR:	6. GROUP:		

Q/N	QUESTIONS (Circle code(s) as appropriate where relevant)	RESPONSE	CODE
8	When did the school get the first (set of) computer(s)?	Before 1986 1986 – 1990 1991 – 1995 1996 – 2000 2001 and above	01 02 03 04 05
9	Does the school have a specific budget for computers?	Yes No	01 02
10	Which of the following technology items are used in this school? **(Circle as many options as are applicable)**	Personal Computers (PCs) Laptop Palmtop E-Mail Local Area Network Wide Area Network Internet Scanner **Others** (Specify)	01 02 03 04 05 06 07 08
11	My school makes use of **(Circle as many options as are applicable)**	Softwares purchased off-the-shelf Customized-In-House softwares Microsoft Application Packages	01 02 03
12	Which of the following items are available in the school? **(Circle as many options as are applicable)**	Electricity Uninterrupted Power Supply (UPS) Telephone Relevant Administrative Software Packages Up-to-date Anti Virus	01 02 03 04 05

QUESTION 16 REFERS TO FUNCTIONAL COMPUTERS ONLY

Please indicate the number of functional computers in the school

		Pentium I and Below	Pentium II/III	Pentium IV
13	Number available			
14	Number attached to printer			

APPENDIX C

UNIVERSITY OF LAGOS
DEPARTMENT OF EDUCATIONAL ADMINISTRATION

COMPUTER USE ASSESSMENT QUESTIONNAIRE

Thank you for completing this schedule. The purpose of this survey is to collect data regarding the use of computers in general administration of schools. Your participation is an important part of this effort. Please answer all the questions as fully as possible.

This is not a test and there are no correct or incorrect answers. **Your responses will be kept strictly confidential.**

QUESTIONNAIRE FOR ALL STAFF

BACKGROUND INFORMATION ABOUT THE SCHOOL:

		RESPONSE			
1	**STATE**				
2	**NAME OF SCHOOL**				
3	**LOCATION**	RURAL URBAN **Pls, Tick One only**			
4	**TYPE OF SCHOOL**	PUBLIC PRIVATE **Pls, Tick One only**			
5	**YEAR ESTABLISHED**				
6	**SCHOOL SIZE**	**TOTAL STAFF**		**TOTAL STUDENTS**	
		Male	**Female**	**Male**	**Female**
7	**OWNERSHIP**	***Pls, Tick One only*** 1. FED. GOVERNMENT 2. STATE GOVERNMENT: 3. VOLUNTARY AGENCY: 4. COMMUNITY: 5. SOLE PROPRIETOR: 6. GROUP:			
8	**RESPONDENT'S STATUS IN SCHOOL**	***Pls, Tick One only*** 1. PRINCIPAL 2. VICE PPRINCIPAL 3. HEAD OF DEPARTMENT 4. HOUSEMASTER 5. YEAR TUTOR 6. BURSAR 7. SECRETARY **OTHERS** (specify)			
9	**RESPONDENT'S HIGHEST QUALIFICATION**				
10	**RESPONDENT'S SEX**	MALE FEMALE **Pls, Tick One only**			

Q/N	QUESTIONS (Circle code(s) as appropriate where relevant)	RESPONSE	CODE
11	How old are you?	20 – 29 years 30 – 39 " 40 – 49 " 50 and above	01 02 03 04
12	For how long have you been in this school?	1 – 3 years 4 – 7 " 8 – 12 " 13 years and above	01 02 03 04
13	For how long have you been using computers?	Below 3 years 3 – 5 years 6 – 8 years 9 years and above Never	01 02 03 04 05
14	How do you rate your own computer expertise?	Never use Beginner Some experience Intermediate Very experienced Expert user	01 02 03 04 05 06
15	At what level have you been trained on the use of computer? **(Circle as many options as are applicable)**	Undergraduate Graduate course Continuing education School workshop Not trained	01 02 03 04 05
16	What type(s) of in-service computer related training has the school provided for you? **(Circle as many options as are applicable)**	Basic Computer Operations (Word Processing, Spreadsheet) Database Management Statistical Packages E-mail Internet Browsing Accounting Packages Network Administration	01 02 03 04 05 06 07
17	In which of the following applications do you have skills? **(Circle as many options as are applicable)**	Basic introduction to computers Word processing Spreadsheets Database Management Network Administration	01 02 03 04 05
18	Where are the computers in the school located? **(Circle as many options as are applicable)**	In a computer room/lab In the classrooms In the staff rooms In Accounts Department In the Library In Admin Office In the Principal's office	01 02 03 04 05 06 07
19	Does the school place any restriction on the use of the computers in the school?	Yes No	01 02

20	Which of the following categories of staff are allowed to make use of the computers in the school?	All categories of staff Senior staff only Junior staff only Heads of Departments only Principal/Staff in the principal's office only	01 02 03 04 05
21	Do you have access to and use computer outside the school?	Yes No	01 02
22	Which of these factors motivated the school to acquire computers? **(Circle as many options as are applicable)**	Vendors prodding Sensitization consequent upon computer literacy programme organized for the school Donations from agencies and others Need for proper school record keeping and facilitation of administrative duties School's IT curriculum The quest to gain competitive advantage over other schools Quest to facilitate teaching/learning process	01 02 03 04 05 06 07
23	How did the school eventually adopt the use of computers? **(Circle only one option)**	The school always likes to play with new tools because it has a strong financial base The school sees strategic advantage in adopting computers for managing its affairs The school simply makes a deliberate choice to adopt the use of computers The school waited until it considers the adoption of computers less risky The school adopts the use of computers because it is the practice in schools	01 02 03 04 05
24	Please comment on the spread of your school's computer skilled human resources among the departments in the school? **(Circle only one option)**	Every department has computer skilled personnel Most departments have skilled personnel Few departments have skilled personnel Skilled personnel are only in the computer lab The school has no skilled personnel	01 02 03 04 05
25	How did the use of computer gain wide acceptance in the school? **(Circle only one option)**	Through the principal's mandate Through all staff collaborative efforts As convenient for each staff	01 02 03
26	How does the school ensure maximum use of available computers in the school? **(Circle as many options as are applicable)**	Reschedule staff assignment according to their expertise in computer usage Organize training for staff according to their needs Make the use of computers optional for staff	01 02 03

27	Which of the following items are available in the school? **(Circle as many options as are applicable)**	Electricity Uninterrupted Power Supply (UPS) Telephone Relevant Administrative Software packages Up-to-date Anti-Virus	01 02 03 04 05
28	My school makes use of: **(Circle as many options as are applicable)**	Software purchased off-the-shelf Customized-In-house developed package Microsoft Office Application Packages	01 02 03
29	Which person/group mainly provides the maintenance and technical support for the school computers?	Principal Knowledgeable members of staff Private professionals/commercial providers Volunteer PTA member No specific person or group	01 02 03 04 05
30	Who is mainly responsible for computer matters in the school (e.g., the person who undertakes tasks like planning, budgeting, acquiring equipment and software)?	Principal Knowledgeable members of staff Private professionals/commercial providers Volunteer PTA member No specific person or group	01 02 03 04 05
31	Does the school have a specific budget for computers?	Yes No	01 02
32	Tick the items the computer budget of the school has been spent on for the last two years **(Circle as many options as are applicable)**	Purchase of new computers Upgrading of existing computers Purchasing of new software Staff training on acquisition of computer skill Maintenance of computers Purchase of computer stationeries Generator	01 02 03 04 05 06 07
33	Which of these factors facilitate the use of available computers in the school? **(Circle as many options as are applicable)**	Extensive computer facilities within the school Availability of other information technology equipment Need for uniqueness and innovation Pressure from competitors Strong technical support Strong top management support Strong market position of the school Strong planning capacity of the school Strong financial position of the school Principal's personal interest Management style Need for quality assurance User training Awareness of new technological developments	01 02 03 04 05 06 07 08 09 10 11 12 13 14

34	Suggest other factors that may facilitate administrative use of computers		
35	Which of these factors <u>inhibit</u> the use of available computers in the school? **(Circle as many options as are applicable)**	Limited rooms that are suitable for computers Poor ventilation and lighting of rooms Power failures due to poor electricity supply No phone line that can transmit data Vandalism of equipment and facilities Poor security on school premises Obsolete computer equipment Lack of knowledge of use of computer/software Transfer of skilled personnel Fear of computer Fear that computer may take over staff role Fear that students will abuse computers Lack of maintenance Budgetary constraints Ill-defined management objectives Lack of top management support Lack of appropriate skill development progamme Lack of appropriate technical support staff	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
36	Please suggest other factors that may inhibit administrative use of computers		
37	For which of these duties do you use the computers? **(Circle as many options as are applicable)**	Students' Admission Register Students' Attendance Register Students' personal and academic records Collation of examination scores School accounts Personnel records Time tabling Design of school documents Teachers' weekly diaries and scheme of work Inventory of school facilities	01 02 03 04 05 06 07 08 09 10

APPENDIX D

CORRELATION MATRICES FOR INSTRUMENTS VALIDITY TESTS

COMPUTER USE ASSESSMENT QUESTIONNAIRE (CUAQ)

	ACCESS			FUNDS		INFRASTRCTURE			LENGTH OF USE	RATIONALE		SKILL DEVELOPMENT		KNOWLEDGE OF USE	
ITEMS	**ACS1**	**ACS2**	**ACS3**	**FND1**	**FND2**	**INFR1**	**INFR2**	**INFR3**	**LUSE**	**RATN1**	**RATN2**	**SKLL1**	**SKLL2**	**KNLG1**	**KNLG2**
ACS1	1.00	.88	.89	.12	.09	.06	.17	.08	.18	.07	.04	.12	.04	.09	.19
ACS2	.88	1.00	.82	.16	.04	.12	.09	.04	.14	.01	.04	.08	.12	.06	.08
ACS3	.89	.82	1.00	.08	.01	.11	.16	.02	.09	.01	.12	.05	.12	.11	.13
FND1	.12	.16	.08	1.00	.85	.03	.12	.15	.02	.00	.04	.13	.15	.07	.17
FND2	.09	.04	.01	.85	1.00	.14	.04	.19	.01	.07	.07	.11	.09	.18	.14
INFR1	.06	.12	.11	.03	.14	1.00	.85	.89	.00	.02	.04	.01	.06	.19	.11
INFR2	.17	.09	.16	.12	.04	.85	1.00	.91	.06	.05	.11	.17	.16	.14	.18
INFR3	.08	.04	.02	.15	.19	.89	.91	1.00	.05	.02	.16	.17	.12	.17	.10
LUSE	.18	.14	.09	.02	.01	.00	.06	.05	1.00	.04	.09	.19	.05	.16	.18
RATN1	.07	.01	.01	.00	.07	.02	.05	.02	.04	1.00	.96	.08	.01	.19	.05
RATN2	.04	.04	.12	.04	.07	.04	.11	.16	.09	.96	1.00	.01	.04	.15	.14
SKLL1	.12	.08	.05	.13	.11	.01	.17	.17	.19	.08	.01	1.00	.91	.03	.07
SKLL2	.04	.12	.12	.15	.09	.06	.16	.12	.05	.01	.04	.91	1.00	.16	.09
KNLG1	.09	.06	.11	.07	.18	.19	.14	.17	.16	.19	.15	.03	.16	1.00	.84
KNLG2	.19	.08	.13	.17	.14	.11	.18	.10	.18	.05	.14	.07	.09	.84	1.00

Key

ACS1 = Item 18 ACS2 = Item 19 ACS3 = Item 20 FND1 = Item 31 FND2 = Item 32

INFR1 = Item 27 INFR2 = Item 28 INFR3 = Item 29 LUSE = Item 13 RATN1 = Item 22

RATN2 = Item 23 SKLL1 = Item 16 SKLL2 = Item 26 KNLG1 = Item 14 KNLG2 = Item 17

ATTITUDE SCALE (AS)

ITEMS	USE_HD	N_APEAL	W_SKLL	C_ENJOY	C_NAVOS	C_SCADM	INTRACT	C_ASSTED	EFFE_ADM	USE_BAD	C_STFLE	CONFSD	CONFDT	TWST	L_NE
USE_HD	1.00	.98	.17	.10	.87	.08	.04	.14	.82	.87	.93	.85	.19	.81	.17
N_APEAL	.98	1.00	.19	.15	.81	.11	.18	.09	.94	.83	.86	.88	.07	.86	.09
W_SKLL	.17	.19	1.00	.94	.07	.89	.92	.93	.19	.14	.07	.12	.87	.09	.90
C_ENJOY	.10	.15	.94	1.00	.08	.82	.88	.91	.18	.00	.06	.02	.92	.01	.87
C_NAVOS	.87	.81	.07	.08	1.00	.13	.17	.09	.89	.81	.91	.81	.06	.84	.03
C_SCADM	.08	.11	.89	.82	.13	1.00	.97	.91	.16	.07	.04	.15	.87	.07	.86
INTRACT	.04	.18	.92	.88	.17	.97	1.00	.89	.14	.14	.19	.08	.99	.06	.90
C_ASSTED	.14	.09	.93	.91	.09	.91	.89	1.00	.08	.00	.05	.02	.86	.03	.89
EFFE_ADM	.02	.94	.19	.18	.89	.16	.14	.08	1.00	.97	.86	.89	.12	.91	.11
USE_BAD	.87	.83	.14	.00	.81	.07	.14	.00	.97	1.00	.87	.87	.13	.89	.07
C_STFLE	.93	.86	.07	.06	.91	.04	.19	.05	.86	.87	1.00	.90	.14	.84	.15
CONFSD	.85	.88	.12	.02	.81	.15	.08	.02	.89	.87	.90	1.00	.01	.88	.08
CONFDT	.19	.07	.87	.92	.0	.87	.99	.86	.12	.13	.14	.01	1.00	.19	.90
TWST	.81	.86	.09	.01	.84	.07	.06	.03	.91	.89	.84	.88	.19	1.00	.00
L_NEC	.17	.09	.90	.87	.03	.86	.90	.89	.11	.07	.15	.08	.90	.00	1.00

Key

USE_HD = Item 11 N_APEAL = Item 12 W_SKLL = Item 13 C_ENJOY = Item 14 C_NAVOS = Item 15

C_SCADM = Item 16 INTRACT = Item 17 C_ASSTED = Item 18 EFFE_ADM = Item 19 USE_BAD = Item 20

C_STFLE = Item 21 CONFSD = Item 22 CONFDT = Item 23 TWST = Item 24 L_NEC = Item 25